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AND

COAL

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RICHARD P. ROTHWELL, C.E., M.E., ROSSITER W. RAYMOND, Ph.D., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus *; and only for articles so signed is he responsible.

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MAKING a profit on the mining and treating of a hard copper ore that has a gross value of $1.73 per ton is the magnificent and altogether unequaled record of the Atlantic Company of Lake Superior for the past year, the most economical work on record.

THEY have a fair specimen of the "metallurgical crank" species, HARRISON by name, at Sydney, New South Wales. This inventor has a new process for making iron by injecting "hydrogen and bicarbureted hydrogen (coal-gas) into the blast-furnace. The hydrogen carries off the impurities, and pure iron is left in the bed of the furnace." It is needless to say that this process is going to "create a revolution" in iron-making and to enable New South Wales to beat the world. We have some of these "revolutionary" metallurgists left in this country that we would be happy to supply, out of pure philanthropy, to some of England's other colonies, or even to England herself.

PRESIDENT ROBERTS, of the Pennsylvania Railroad, at the annual meeting just held in Philadelphia, stated that the company was everywhere rigidly reducing expenses, and that on the lines west of Pittsburg there is scarcely any work now doing in the nature of improvements, the economy being so radical that the slight expenditures authorized are hardly sufficient properly to sustain their efficiency. This is about the general condition of affairs throughout the railroad world. The roads are in need of repairs, but can not afford to make them. Should an improvement in general business take place, the roads might be able to raise the necessary money, and a sharp demand for rails and rolling stock would promptly follow.

IT is reported that the Wyoming Valley Coal Company has sold its Wyoming Colliery, near Wilkes-Barre, Pa., to the Lehigh Valley Coal Company (Lehigh Valley Railroad). The price paid is said to be $200,000. J. H. SWOYER, Esq., of Wilkes-Barre, Pa., was the principal stockholder of the Wyoming Valley Coal Company, and has for many years been one of the principal coal operators in this district. The inevitable tendency is toward the consolidation of properties, the withdrawal of individual operators, and the concentration of mining in the hands of a few large companies. Will the end be one great corporation owning and mining all our anthracite coal? And which of these serpents will swallow the others?

A FEW weeks ago, we published Umpire WEEKS'S award, which fixed a sliding-scale of wages for the miners at Pittsburg, based upon the selling price of coal, the wages from February 1st to be 2½ cents per bushel of 76 pounds. The Miners' Union has refused to accept the award, and at present it is said that several thousand men are out. The men ask 3 cents a bushel, and there is only a small number of mines at present working on the 2½ cent basis.

This may seriously interfere with the supplies of the mills and furnaces, some of which had just begun work on their spring orders. It is not a good time to strike when so many men throughout the country are idle; but the strike, whether successful or not from the miners' standpoint, can not but be very injurious to the industries in Pittsburg now struggling toward better times.

WE publish this week a caustic reply to the letter of "C. U. E." in our columns last week, on the subject of Civil *vs.* Army Engineers. The combatants in this case appear to be able to take care of themselves; and we think it unnecessary—indeed, between two such sharp blades, it might be dangerous—to interfere. We shall be glad to have the discussion go on, so long as it throws light on the subject, and does not overtax our space. As for the vista opened by "SPECTATOR," of a possible unlimited series of articles on this subject, we must be excused from promising beforehand to surrender our columns to them. Let "SPECTATOR" proceed, however; only not too voluminously. The promise of a large slice of the *Army Register* to begin with is somewhat appalling; but we will do our best to swallow it without choking. Yet we reserve the right to choke.

THE Clapp-Griffiths fixed converter system of steel making is attracting great attention among our iron men, and we hear of several pig-iron producers that are talking of introducing it. It is estimated that from $40,000 to $50,000 will cover the cost of the plant, and there is asked, we understand, a royalty of 25 cents a ton of iron converted.

The general introduction of this comparatively inexpensive plant would prove very injurious to the enormous investments in our present large Bessemer works; but the facility with which it can be erected would soon cause such a number of Clapp-Griffiths plants to go up that the cost of steel would naturally and inevitably sink to nearly the cost of pig-iron, plus the seven dollars a ton, the estimated cost of conversion. The metal produced appears to be well adapted to most of the uses of steel, such as nails, wire rods, sheets, bars, axles, shovels, etc.; but Mr. R. W. HUNT still believes that it will not make rails, ship plates, and other heavy forms of steel in competition with a Bessemer plant.

TWO terrible explosions have recently occurred in European coal mines: one at Karwin, in Silesia, in which 123 men, out of a total of 147 who were in the mine at the time, were found suffocated, and at the last advices only five men had been rescued alive. The second was an explosion of fire-damp at the Ushworth Colliery, near Sunderland, in the north of England, on March 3d, where 150 men were imprisoned. The bodies of 36 of these were subsequently recovered; but the pit is now on fire, and further search is stopped.

Fortunately, in our own country, if we except the Richmond Basin, we have not had any of these frightful calamities to record since the anthracite mine ventilation law went into effect. Nor is this fortunate exemption due to freedom of fire-damp in our mines; for probably no

other collieries in any part of the world produce such enormous volumes of this dangerous gas as do some of those near Wilkes-Barre, Pennsylvania. Our exemption is solely due to the better ventilation and more intelligent supervision exercised.

It is not probable that we shall ever be able to make a "fiery" mine absolutely safe; but large and well-arranged air-ways and plenty of fresh air, strict discipline, and vigilance, can prevent any such terrible disasters (we hesitate to say "accidents") as those recorded above. We do not know what the immediate cause of these explosions was; but it was in all probability some carelessness on the part of a workman in a mine that was insufficiently ventilated.

A NEW AND REMARKABLE GOLD DEPOSIT.

Through the courtesy of Mr. JOHN MUSSON, of Sydney, New South Wales, we have received the report of Mr. R. L. JACK, of the Queensland Geological Survey, on the Mount Morgan Gold Deposit.

Mount Morgan is only twenty-two miles from Rockhampton, on the Fitzroy River, and not more than half that distance from the Central Railroad. It is an isolated cone, rising from the plain through which runs the river Dee, the plain being flanked east and west by bluffs of Mesozoic sandstone, out of which the valley has evidently been carved down to the level of the primitive stratified rocks that now form its floor. These old shales and quartzites are riven by dikes of rhiolite; and through them have evidently come to the surface geyser springs, the deposit from which has formed the cone of Mount Morgan. The water has, besides gold, carried in solution silica, iron, alumina, etc. But the gold seems to have been precipitated chiefly in the cup of the geyser, and to be richest in a large mass of iron ore, which, in the form of an inverted cone, forms the vertical axis of the mountain, and in the nodules of iron ore that occur in certain soft cellular siliceous layers. These alternate with more or less ferruginous layers, all of which radiate, like the leaves of a fan, from the base of the cone, and inclose the iron ore. Gold occurs in all the layers, except in a siliceous earth, and therefore its association with iron is certainly not accidental.

Mining is conducted by quarrying down the apex of the cone, and from an open cut 100 feet below the summit. The yield of the rock is almost fabulous. Working returns are not given; but fair samples selected by Mr. JACK gave from a quarter of an ounce to 10 ounces per ton, and others sent to the Sydney Mint to be experimented on gave 85 ounces per ton. Some of the rock in these samples was selected.

Prolonged amalgamation extracts only about half the gold; but during the few months the mine was worked, prior to the publication of the memoir, the Sydney Mint had received 10,000 ounces. It differed from any other gold known to commerce in that it was unalloyed with silver, assaying 99·7 per cent of pure gold, the 0·3 per cent being copper and iron.

A few more such mines would relieve the financial world of the apprehension it seems to be laboring under of a scarcity of gold.

It is worthy of note that the report was mailed in Sydney, on January 28th, and received here on February 28th.

As might be expected, the wildest estimates of the value of this gold deposit or hill are circulating. One that we have seen gives it at about $135,000,000.

INQUIRIES RESPECTING APPRENTICESHIP.

The Bureau of Education, Department of the Interior, Washington, is making what promises to be a very valuable investigation, as may be seen by the following circular:

"One of the vital questions affecting the present maintenance and future development of American manufacturing industries is the question how employers are to secure an adequate supply of well-trained mechanics. The apprenticeship system of the past, more or less modified to meet modern requirements, has hitherto been almost exclusively relied upon. While in practice that system is gradually becoming obsolete, there is a growing belief among specialists who have studied the subject that the system itself has survived its effective usefulness and that the manual labor school is destined to supplant it. In order to reach a settled conviction on this important subject, however, it will be necessary to bring together a considerable amount of trustworthy information; and the accompanying inquiries, to which your attention is respectfully invited, have been prepared with the view of collecting the needed data. When a sufficient number of replies shall have been received to warrant inferences from the facts, the result will be published in a special report on Apprenticeship and Manual Labor Instruction in Schools. Issued by this office in two parts, the first of these will contain a compilation of the apprenticeship laws and decisions thereunder, a brief discussion of apprenticeship at the common law, and a succinct history of the rise, growth, and decay of the system. The last portion of the first volume will contain a *résumé* and analysis of the replies that may be received to the accompanying questions. The second part of the work will give an account of the attempts in this and other countries to provide trade schools fitted to take the place hitherto filled by the apprenticeship system, and will discuss the various degrees of success which have attended such efforts."

Blanks accompany this circular, which may be obtained from Mr. John Eaton, Commissioner, Washington, D. C.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Ozokerite or Mineral Wax.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the JOURNAL of February 21st, you make inquiry for ozokerite. This territory is full of coal and coal-oil; also, any quantity of ozokerite, of which we inclose sample. There has been little or no development of these claims, as there was no call for the mineral and no money for development. We send you copy (marked) of the *Boomerang*, with description of the location of this deposit. This is only one of many. Yours truly,

LARAMIE, WYOMING, March 6. WILLIAM H. ROOT.

[The sample inclosed by our correspondent is of good quality. The only question would be that of quantity.—EDITOR E. AND M. J.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: As a subscriber to the ENGINEERING AND MINING JOURNAL, I found in the last issue of that paper a notice referring to a hydrocarbon compound, for which you say there is a demand. A sample of such a compound given to me some time ago, and taken from a deposit in the State of Durango, some sixty miles from here, you will find inclosed; and if it should happen to be the right stuff you are looking after, I would like to have from you more particulars, and make a personal investigation about the deposit. Respectfully yours, ALBERT GRÄPER, M.E.

PARRAL, MEXICO, March 1.

[The sample sent is not ozokerite, although apparently it contains some carbonaceous matter.—EDITOR E. AND M. J.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I notice in your issue of February 21st, a request for information about the "mineral wax" deposits in Utah, and as I am occasionally receiving letters from various points in the Eastern States, and Europe also, asking information on the character and extent of the ozokerite deposits of Utah, I think it the best plan to comply with your request, and answer, as far as my information will enable me to do so, by a letter to the ENGINEERING AND MINING JOURNAL.

GEOLOGICAL SITUATION.

The paraffine oil shales are found in the east flank of the Wahsatch range, the south flank of the Uintah range, and the west flank of the Colorado portion of the continental divide, or the Rocky Mountain range, especially that portion of it north of Grand River. These beds are probably Miocene Tertiary, and at one time undoubtedly covered the entire area of the great inland sea now known as the sandstone country of Utah, Colorado, Arizona, and New Mexico—a region about 400 miles in length from northwest to southeast, and 200 miles or more in width from northeast to southwest.

At the close of the Tertiary age, the elevation of the Wahsatch, Uintah, and Colorado ranges—especially that portion known as the San Juan Mountains—gave a new outlet to the waters of this basin through what is now known as the Colorado Cañon, one of the deepest gorges in the world. The vast flow of water during the "flood period" immediately following these great geological disturbances at the close of the Tertiary age—which, later on, merged into the Glacial epoch—gradually cut down this outlet, so as to drain out the entire basin. Then began the process of denuding the upper beds of the basin itself, by first cutting deep channels on the principal lines of drainage into the main outlet, and smaller ones later on, gradually extending back to the flanks of the surrounding mountains, until, at the present day, it is perhaps the most wonderful system of "box cañons" and deep gorges known on this continent or in the world.

BITUMINOUS SHALES.

The Tertiary shales have been swept away from all the central areas of the old basin; but in the higher plateaus along the flanks of the ranges, between the deep cañons, and even to the summit of the Wahsatch range in many places, these Tertiary oil shales are found covering large areas of country.

A peculiar feature of these oil shale beds is, that they are not equally rich in paraffine or wax. In some localities, they are very thick, and rich in oil, but poor in paraffine, and the exudations along the flanks of the cañons are simply asphalt, with little or no paraffine. In other localities, the exudations are wax-like and rich in paraffine; but I do not know of any locality where the wax exists in any considerable deposits. In all the localities that I have examined in the Wahsatch range, about the heads of Spanish Fork Cañon, and the heads of Price River (including White River and Fish Creek, its principal tributaries), the wax occurs as exudations from the shale-beds that have been cut by ravines so as to expose sections of the beds, or where they have been folded by the upheavals, and their edges exposed by denudation.

In studying the underlying as well as the overlying beds, I find, below the richest zone of shales, a series of compact beds, in places aggregating in thickness 100 feet or more, that are full of fresh-water fossils, of the usual Tertiary type. The shells in some bands form the major part of the mass. The shaly portion is dark or blackish, in fresh fractures, and contains more or less oil. In some cases, thin splinters of it can be lighted with a match.

Overlying these fossil beds is a very fine clay shale with very few fossils in it, varying in thickness from five or six to twenty feet or more, which is very rich in oil, and, in some localities, rich in paraffine, both as impregnations and in very thin scales and films between the thin laminæ of the shales.

This upper bed of oil shale is remarkably tough. Weathered samples assume a grayish or brownish-gray color, and divide readily into thin sheets, and will warp in the sun like thin sheets of wood. There seems to be no sand or grit in them. One can saw them as readily as if they were boards. Above this, is a continuation of what appears to be the same close-grained clay shale, of a dove color, many feet in thickness, say from 20 to 40 feet, but containing no oil or paraffine. The oil appears to have penetrated a few feet into this overlying clay shale *from below*,

in some places impregnating it from 10 to 20 feet, while in other places not more than a foot or two.

ORIGIN OF THE OZOKERITE.

These facts seem to indicate that the oil is of animal origin from the underlying fossil beds above mentioned. Be that as it may, the facts are substantially as I have stated them.

Why these beds give crude oil and asphalt in some localities, and paraffine oils in other places, is a conundrum not yet answered. The best paraffine shales yet found are near the rim or *outer edge* of the old Tertiary lake or sea. Here, large lagoons or lakelets may have been filled with fresh water, and the vegetable slimes and mosses were sufficiently abundant to feed the myriads of mollusca that became periodically entombed in the muddy ooze of the shallow lakes or lagoons that were more or less isolated from the main body of water, thus giving more organic remains of the right sort in some localities than in others.

The facts seem to warrant the suggestion, that the local conditions gave an abundant type of organic life of the right kind in some places; while in other localities, the vegetable and animal life produced oils almost destitute of paraffine.

A careful investigation of the fossiliferous beds underlying the different varieties of oil impregnations would throw some light on the subject. It might possibly reveal the true origin of all the fossil oils, as well as the causes that have produced the different varieties of oil in the same zone of beds, only a few miles apart.

ECONOMIC VALUES.

No deposits of "mineral wax" have been found in this old Tertiary basin that equal in richness or purity the ozokerite deposits of Galicia in Austria. Such deposits *may* exist somewhere in this large stretch of the Tertiary beds of the Rocky Mountains; but they have not yet been discovered. In the light of our present knowledge, I am inclined to believe that the only way to get the paraffine in large quantity is to distill the shales on a large scale, by a similar process to that now used in Scotland. The deposits of "wax" are small, and scattered over large areas of country. Hence, the collection of the impure varieties of ozokerite found in Utah could not be relied upon to supply any considerable demand.

Systematic explorations by boring and otherwise may reveal rich deposits of the mineral; but this requires the employment of special skill and the expenditure of considerable sums of money. All I can say about it now may be summed up in this: That it is a promising field for such explorations; but in my opinion, the *distillation* of the shales must be finally relied upon for the production of any large supply of paraffine.

No. 76 WEST SECOND SOUTH STREET, J. E. CLAYTON.
SALT LAKE CITY, UTAH, March 1, 1885.

Civil vs. Military Engineers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The lengthy communication of "C. U. E." in the last number of the JOURNAL, on "Civil *vs.* Military Engineers," opens a subject to which justice can not be done in a single article—especially if, before discussing the main question, the ground must be cleared of the misrepresentations with which it has been surrounded. I ask the courtesy of your columns for the present letter, in which I shall address myself to "C. U. E.;" and, if the subject should be deemed of sufficient interest, and my contributions to the discussion of sufficient importance, I shall be glad of the opportunity to consider in future letters the present system of prosecuting national public works, and the system (or lack of system) proposed in its place. I beg to say at the outset, that I am not a graduate of West Point, or an officer of the army, or in any way concerned in the question at issue, either as an engineer now employed, or one who would like to be, but is not, employed, by the United States government. My qualifications for this controversy are a somewhat extended knowledge of the actual operation and history of the present American system, and of the technical education of engineers at the schools of this country (including West Point) and of other countries, and a wide acquaintance with the civil and military engineers of the United States—to which I may add some experience as an instructor. It is true that these qualifications are not as profound and precise as I could wish; but I am encouraged to rely upon them by recent illustrations in various quarters of the amount of dogmatic business which can be based on a much smaller capital of information.

Your correspondent, in common with those who have uttered similar views in Congress and the newspapers, begins with a gratuitous insult to the United States Engineer Corps. He thinks "the time has arrived" to comment upon "the control that military engineers have assumed" of fields legitimately belonging to the civil engineer; and adds, apparently as his reason for thus thinking, that the "encroachment" has grown to be serious. Then follows the usual allusion to the "self-constituted," "ungenerous," and "overbearing" "aristocracy" of West Point.

"C. U. E." proposes to furnish proof of his introductory statements; but he has conveniently forgotten to prove the statements I quote. As a matter of fact, the military engineers have never "assumed" control of any thing. Such control has always been assigned by Congress *without their solicitation*. I am familiar with the history of this matter at Washington; and I know how powerful has been the lobby influence exerted at various times in favor of civilian control of public works. I know also that the Chief of Engineers has occasionally opposed the surrender of the control already vested in his corps; that is, he has resisted proposed "encroachments;" but, to my knowledge, neither the chief nor his corps has ever asked for new and enlarged functions. The notion that "the time has arrived" to attack these presumptuous interlopers is highly amusing to one who remembers, as I do, that this time had already arrived when Jefferson Davis was Secretary of War, and that there has been no time since that when somebody was not saying "a few words" in abuse of West Point engineers, and in favor of having the works of the government conducted by men whom the government had not educated and prepared.

The assertion that the "aristocracy" of West Point engineers is "ungenerous" and "overbearing" is one of those glittering generalities in which demagogues indulge, and which engineers ought to scorn. An aristocracy comprised of individuals who possess "uniform personal worth," and who owe their position to demonstrated fitness, long special training, and an implied contract by which they give their service for life, sacrificing the larger rewards of their profession, in return for small but steady payment, and slow but sure promotion—such an "aristocracy" is simply no aristocracy at all; and the attempt of "C. U. E." to use against it the vulgar missiles, but in a gentlemanly way, is both unnecessary and futile. A gentleman can not be effective as a blackguard, even if he tries. He is sure to betray at the critical moment that he is a gentleman, after all, by dropping the weapons of the blackguard when they have accomplished nothing but to soil his hands.

But this initial mistake in manners is followed by a series of mistakes in fact, which I shall briefly notice.

1. "C. U. E." is entirely ignorant of the course pursued at West Point. As I hope to consider this subject more fully hereafter, I will merely observe here, that no one familiar with it would attempt to judge it from the West Point *Register*, without consulting the *Regulations* of the Academy. The former gives an outline of the studies and text-books. The latter gives the course of instruction. But both are so condensed that they can not be compared with the catalogues and circulars of our technical schools, in which the most is made of every direct or indirect, principal or incidental, regular or occasional, means of instruction. For instance, there is at West Point a large amount of instruction by lectures (perhaps not exceeded at any other school of engineering in the country) and a still larger amount of practical field and laboratory instruction, which in the catalogue of any other institution would be paraded at length, but which are not mentioned (or are but slightly and in part mentioned) in the corresponding publications of West Point

Not only by this blunder, but also by another oversight of equal importance, is "C. U. E."'s comparative view vitiated. He forgets entirely the difference between a school having but one vacation in four years, no intermission of discipline day or night, and no social distractions, and any one of our ordinary technical schools, where recitations can be "cut," and evenings can be spent in society, and students can get leaves of absence without difficulty, and regular vacations amount to nearly one third of the year. Without imitating his absurd calculation here (though I have performed his operation upon the register of a leading technical school, with results that would, perhaps, surprise him), I do not hesitate to say that the amount of engineering instruction given at West Point and of hard work in study and practice exacted from students there, surpasses that which can be found in any other American school. In fact, the greatest deficiency of the West Point course is in general culture. As a special school of engineering, it is unsurpassed.

2. But nobody who knows the facts would say that the education of the West Point graduate "fits him to take charge of civil works." Why should "C. U. E." seriously controvert what nobody claims? The facts are these:

The entrance examination at West Point is easy. It gives every body a chance to try. A large number of those who enter come from colleges and technical schools, many being actually graduates. From these, most of the engineer graduates come. When a student without good previous preparation graduates so high as to enter the Engineer Corps, *he is always a remarkable man*. In other words, genius tells, as it ought to; but in the absence of such special genius, previous training tells, as it ought to.

To enter the Engineers, a man must be one of the very few very best in the graduating class. From some classes no engineers are selected; and such selections are always made on the record of four years' trial as well as on the examinations, and made by a tribunal which is impartial and incorruptible beyond suspicion. Can any better method be devised for the selection of from one to five capable young engineers than the sifting of over a hundred candidates through a four years' trial, by an authority which reserves the right to reject them all?

The young engineer must now spend two years and a half at the "Engineers' School of Application," at Willets Point.

He is then detailed as assistant in actual practice; and is moved from place to place and from one kind of work to another, with the express purpose of giving him, under competent superiors, a thorough and varied experience. At every step of promotion, he is obliged to pass an examination in all branches of engineering and in other subjects. The course of such examinations is about as follows: A board of three officers examines the candidate orally (not as one of a class, taking his turn, but alone) for at least six hours (I have known this to be extended to several days, when the first result was not completely satisfactory), and receives from him for examination all his note-books and all his published memoirs. After this, he is allowed a week to prepare a *projet* and a memoir upon a subject then given him for the first time. A failure in either of these tests postpones his promotion for one year, after which he is re-examined. If he fails a second time, he is discharged from the service.

WHAT OFFICERS HAVE CHARGE OF WORK.

No officer under the rank of captain is assigned to the charge of public works. Some of the captains of engineers are still assistants, under resident superiors. In other words, a West Point graduate must have had, besides his four years' course at the preparatory school, a term of service averaging over fourteen years (including two years and a half at Willets Point) and including at least two rigorous post-graduate examinations (besides those held at Willets Point) before he is, to use "C. U. E."'s language, "placed with authority in charge of construction." I have said that the term of training averages over fourteen years. The fact is, that the officers now in charge of public works average nearer twenty years of such preliminary experience. The *junior* officer (Captain Rossel, now in charge of certain river and harbor improvements at Jacksonville, Florida) was graduated from West Point in 1873. His case is regarded as an exceptional one, in that he has attained a quasi-independent charge so early in his career. I say "quasi-independent;" for he is subject to a supervising engineer, Lieut.-Colonel Houston, who has charge of four districts, and who was graduated in 1856.

Now, if "C. U. E." has a better course of training to propose, let him propose it. But if he thinks he can construct an argument by combin-

ing ignorance as to the system he attacks with silence as to the system he desires, he is not on safe engineering ground. Even if his superstructure be a vacuum, he had better base it on a fact.

It may perhaps be replied that "C.U.E." is not absolutely silent as to the substitute he would propose. He does indeed suggest "the creation of a suitable bureau under some one of the government departments, placed under properly educated engineers and under a strict civil service plan." But since this is *verbatim et literatim* what we have at present, the suggestion is empty. The Corps of Engineers is such a bureau; it is under the War Department; it is directed by properly educated officers; and its plan is the very type which has been followed by the civil service reformers. Moreover, the arguments by which it is assailed are familiar arguments of the opponents of civil service reform, who are forever crying that the public service is a sort of crib, at which every citizen ought to have a bite in turn, and that the appointment of officers on tested capacity, and their tenure, promotion, or dismissal upon merit or demerit only, create an "aristocracy."

3. The references made by "C. U. E." to foreign systems are scarcely more successful than his attempt to describe our own. Postponing, for a time at least, the detailed inquiry into this branch of the subject, I merely remark in passing that the omission of all allusion to the fact that several hundred officers of the British Royal Engineers are now employed on public works in India directly impugns either the knowledge or the candor of your correspondent.

4. As to the comparative cost of work done by our military engineers, "C. U. E." is equally at fault. As an engineer, he should know that the cost of triangulation, for instance, varies with the nature of the country and of the work. A comparison "per square mile" is about as unscientific and as unworthy of a professional man as could well be devised. If he wishes to prepare himself for a further discussion of this subject by a modest acquaintance with its elements, let him read the letter of Major Comstock to the Chief of Engineers, dated Detroit. October 25th, 1875, in which the outlines are clearly set forth, and certain statistics are given, which civil engineers would do well to consider.

5. As to the assertion that military engineers deprive their subordinates of proper credit for work done, it is absurdly untrue. Every annual report of the Chief of Engineers, bristling with the names of civilian assistants, contradicts it. But we are quite familiar with this sort of envious comment. Every understrapper who copies the drawings or calculates the strains for an engineering structure thinks his work is underrated by his superiors. How long is it since we were regaled with the complaints of the man who (in his own opinion) really built the St. Louis bridge, while Captain Eads got the credit of it?

It is a significant fact that, at this time, a similar controversy is going on in France. The engineers who are not graduates of the *École des Ponts et Chaussées* are complaining of *that* "aristocracy," and demanding to be "let in" to the superintendence of public works. In fact, the attempt of the "outs" to get in is not peculiar to this country or to France. It is universal; and also universal in the disinclination to get in by the old, established, and slow way, and the desire to substitute some kind of short cut. Civil engineers would like, no doubt, to get into the government service under conditions which would not practically amount to a complete dedication of their lives to it. They would like to have a chance at the glorious or the easy jobs, without being bound to accept the obscure, difficult, and disagreeable ones. They would like to be "in charge;" but how many of them propose to undergo eighteen years of slow preparation first? They want to be "appointed;" but how many of them would willingly let their appointments depend upon severe examinations, occurring periodically, years after graduation?

I have but imperfectly covered even the limited field laid out for this letter. I note, as I write, innumerable joints in the armor of "C. U. E." into which I might insert the lance of a just and severe criticism. But I must leave him here. I am well aware that his weakness need not necessarily be the weakness of his cause. It is possible, of course, that he may be simply an ill-armed volunteer champion, whose overthrow leaves untouched the flag he presumptuously pretended to carry. I shall therefore, if permitted, carry this controversy further, and, ignoring the special folly of individual debaters, inquire as to the facts and principles of the main case. I propose, first of all, to do what "C. U. E." and his associates have thus far failed to do, give the exact facts, free from sweeping and vague generalities. I propose to begin with a list of the military engineers now in charge of public works, giving the professional history of each one of them; and I shall challenge the civilian malcontents to say which of these is the example of youth and inexperience, aristocracy, ungenerous and overbearing manners, so bad as to call for the abolition of the system. In short, on this branch of the subject, I will undertake, not indeed to close the mouths that are now so loudly complaining, but to furnish a stopper that ought to do it, if it were an engineering possibility.

There are documents in private circulation in select (but not aristocratic) engineering circles, of which "C. U. E."'s letter is merely an outward sign. It is the existence of an organized and quasi-secret movement to affect the new administration at Washington, which has moved him to think that "the time has arrived to say a few words." The same circumstance has led me to a similar conclusion; and having some information, some leisure, some sense of justice, and no interest in the matter, I am ready to say, if necessary and practicable, a good many words.

NEW YORK, March 12. Very respectfully, SPECTATOR.

Bessemer Steel Production in 1884.—The American Iron and Steel Association has received returns of the Bessemer steel production in the United States for 1884. The total quantity of ingots converted was 1,538,355 net tons. As compared with the production in 1883, there was a falling off of 116,272 tons, or seven per cent. The maximum production of Bessemer steel ingots was reached in 1882, when 1,696,450 tons were converted. The figures for 1884 show a reduction of but nine per cent from the maximum. The quantity produced by the different sections of the country was as follows: Pennsylvania, 1,029,244 net tons; Illinois, 339,068 net tons; other States, 170,043 net tons. The details of rail production for the year are: Bessemer steel, 1,116,041 tons; iron, 21,891 tons; open-hearth steel, 3000 tons. Total, 1,140,932 tons.

OFFICIAL STATEMENTS AND REPORTS.

Franklin Copper Mining Company, Michigan.

The Franklin Mining Company has made its annual report, from which we take the following extracts:

MINING WORK.

The openings made are as follows:

	Feet.
Sunk in shafts	422
" " winzes	130
Drifted on the lode	3,181
" in cross-cuts	206
	3,939
which is in excess of last year	588

The fathoms of ground broken, openings included, are 9347·244. The amount of rock hoisted was 161,067 tons, which cost to manipulate and deliver the mineral to smelting-works $2.22 per ton, which is a saving of 18 cents per ton over 1883, or a total of $28,992.06 for the year. For the ensuing year, the cost of handling a ton of rock hoisted will be *less* than two dollars.

No. 2 shaft has been sunk from the twenty-fourth to a point 97 feet below the twenty-fifth level. The lode for the first 125 feet exhibited some good stamp and barrel copper; but the last 72 feet sunk have not exposed any thing of value.

No. 3 shaft has been sunk from the twenty-third to the twenty-fourth level, and, owing to a bend in the lode to the east, which commenced between the twenty and twenty-first levels (and at the bottom level is 60 feet to the east of said shaft), is in the hanging-wall trap, consequently is unproductive. The lode at this level has been reached by cross-cut, and opened south to No. 2 shaft. Stopes in this back have been started that are yielding a better grade of rock than where the lode was found on its regular dip.

No. 5 shaft has been sunk from the twenty-second to the twenty-third level. The lode in this opening will pay very well to take out. Some portions of it are rich in all grades of mineral. The depths of our working shafts are as follows:

No. 2, 2037 feet; No. 3, 1831 feet; and No. 5, 1710 feet; making an average of 1860 feet, or 310 fathoms. The several levels at No. 2 shaft from the twenty-third to the twenty-fifth have been regularly opened, and exposed about the same class of ground as we have had in this part of the mine for the past three or four years.

The openings made by drifts from Nos. 3 and 5 shafts are from the seventeenth to the twenty-fourth level. The lode in these openings seems to contain about the average amount of copper per fathom we have usually found in these sections of the mine; except the last hundred feet in the eighteenth, and one hundred and twenty feet in the nineteenth level, north of the No. 5 shaft, both of which distances are unproductive.

PROSPECTS FOR 1885.

If the price of copper rules high enough to warrant us in working to our full capacity, etc., I can not see any reason, at this writing, why at least two thousand tons of mineral copper can not be produced in 1885. And with ingot at 12 or 13 cents, considerable profit can be made.

Capt. Johnson Vivian is Superintendent, Mr. Arno Jaehnig, Clerk, Capt. T. Dennis conducts the Mining Department, and Mr. James Moore is in charge of the machinery.

There are in the mine, broken, ready for hoisting, 23,092 tons of ore, which is not valued as an asset.

During the year, 128,878 tons of rock were treated at the mill, producing 4,604,540 pounds of mineral, which yielded 3,748,652 pounds of ingot copper, or 81·41 per cent, or a gain over 1883 of 3103 tons stamped, 399,225 pounds mineral, 259,344 pounds ingot, per 0·37 cent in smelting, and 0·07 per cent in yield per ton of rock.

The amount of mineral in a ton of rock was 1·78 per cent, or 35·73 pounds.

Yield in 1881, 2,667,952 pounds refined copper.
Yield in 1882, 3,264,120 pounds refined copper.
Yield in 1883, 3,489,308 pounds refined copper.
Yield in 1884, 3,748,652 pounds refined copper.

RECEIPTS AND EXPENDITURES FOR THE YEAR 1884.

Receipts.

Cash received for 3,228,241 pounds ingot sold, averaging 13·628		$439,953.75
" for silver		925.06
" " supplies		2,399.83
" " interest		672.77
520,411 pounds ingots on hand, estimated 10·6		55,163.56
		$499,114.97

Expenditures.

At mine, as per yearly cost-sheet	$357,594.04	
All other expenses, smelting, freight, etc	76,922.88	434,516.92
Profit for 1884		$64,598.05

Less.

Loss on copper on hand January 1st, 1884, 1,386,110 pounds, inventoried at 14⅞ cents then; now inventoried at 10·6 = 4·275 cents per pound	59,256.20
Net gain for year 1884	$5,341.85

Highest price received in 1884, 15 cents.
Lowest " " " 10·83 cents.

ASSETS AND LIABILITIES JANUARY 1ST, 1885.

Assets.

Cash on hand	$24,138.79
200,000 pounds copper on hand, sold but not delivered, averaging 13·628	27,256.00
1,906,521 pounds on hand at 10·6	202,691.23
Supplies at mine as per inventory	96,914.33
	$350,400.35

Liabilities.

Mine agent's drafts outstanding	$30,072.62	
Liabilities at mine	25,102.78	
Ditto in Boston, loans (since paid)	45,000.00	
Smelting, November and December	9,100.69	
Freight on copper at Lake	1,629.85	110,965.04
Balance assets January 1st, 1885		$239,494.41

E. & O. E.

The economy with which some of the Lake mines are now worked is remarkable, and reflects great credit upon their management. The cost

for the past year, of $2.22 per ton for mining, milling, and delivering to smelting-works, is a good record, and accounts for a profit being realized out of an ore containing only 1·87 per cent of copper; but when compared with the wonderful record of the Atlantic, making a profit on a similar ore containing only 0·75 per cent of copper, it suggests questions.

Rooks Mining Company, Vermont.

Although the fact has already been commented upon in these pages, it will perhaps still appear strange to be told that there is in Vermont probably the most profitable gold mine on the continent. That is, the proportion of dividends to output is, we believe, larger than in any other mine now worked, although the operations are on a very small scale.

The report of the company for 1884 comes to us in gilt edges, and with a meagerness and indefiniteness of information on some points that would be highly suspicions were the mine in some distant and inaccessible camp. As it is, the many shortcomings in the report appear to be due to ignorance, and we would suggest that it might prove a good investment for the Rooks Mining Company to employ some competent expert to describe its property and analyze the accounts and prepare proper forms for keeping and itemizing them. Sufficient data are not given in the report to enable us to analyze it satisfactorily; but we have tabulated the general results of milling from September 17th, 1883, to January 1st, 1885, as follows:

Months run.	Tons milled.	Average yield per ton.	Total yield.	Dividends.		Expenses.		
				Total.	Per ton.	Total.	Per ton.	Per ton as per report.
6½	383¼	$33.82	$13,960.00	$8,500	$22.18	$5,460.00	$14.25	$10.15
3	288¾	49.87	14,399.92	10,000	34.63	4,399.92	15.24	8.46
3	38·½	50.48	19,613.36	12,500	32.18	7,113.36	18.31	7.45
3	404¼	50.89	20,534.97	15,000	37.11	5,534.97	13.69	7.20
15½	1,464¾	$46.08	$68,506.25	$46,000	.....	$22,506.25	$15.11	.....

From this, it appears the average yield of the ore was $46.08 per ton. (*There is nothing to show the value of the ore, or what percentage was lost in the treatment.*) The total production was $68,506.35 and the dividends paid $46,000. There was no money held in the treasury, the balance at the end of each quarter being but a few hundred dollars. The mining, we are told, can be done for $1 a ton; and as there were but three miners employed to keep the mill supplied, and considering the nature of the vein—calc-spar and oxide of iron in talcose slates, offering free walls and a width of from 5 to 7 feet—this should be ample. The mine is all above water-level and above the adit-level.

The pay-roll calls for 2 engineers, 2 rock-breaker feeders, 2 mill-men, 3 miners, 1 helper, 1 chemist, 1 clerk, and 1 superintendent. One would think this concern rather overloaded by officers, but they are all low priced. The "construction account, extra help," etc., is the heaviest item, sometimes exceeding the pay-roll. The ore is free milling, is dried in the iron bottom of the ore-chute to the mill, crushed in rock-breakers and rolls, and amalgamated by some special process. The bullion is extremely pure, being 97 fine, which is quite remarkable for amalgamated gold. The cost of milling is enormous—$15.11 a ton, including improvement account, for a mill of 5 or 6 tons daily capacity, with a free-milling ore. The company evidently needs expert advice. There are some wild estimates given of the value of the mine, which there are no data to check. If, indeed, the pay-chute is extensive and the milling capacities are increased, as is proposed, this should become one of our great mines.

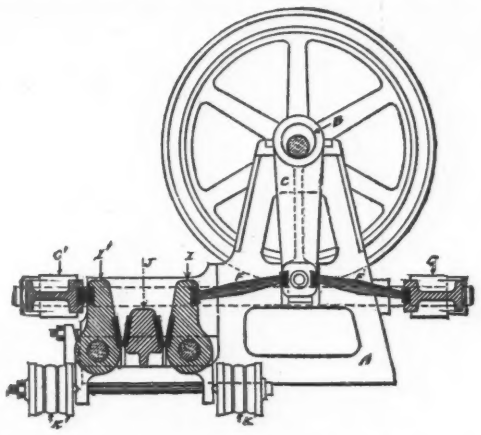
The Rise of a Continent.—In 1750, a series of water-marks was established along all the coasts of Sweden, and these marks or gauges were renewed in 1851 and again in 1884. They have been inspected at short intervals, a systematic record of the observations being preserved. The results have shown that in the 134 years the northern part of Sweden has risen 7 feet, the elevation gradually growing less to the southward, until at Bornholm a point is reached that remains at the same level as in the middle of the last century. The average elevation of the Swedish coast has been about 56 inches. During the same period the coast limiting the Baltic on the south has been steadily sinking. Whether there be a land tide in which the ebb and flow have long but definite periods, may still be a question for the curious to discuss; but it is certain that "firm as a rock" and enduring as "the everlasting hills" are figures of speech that, like many other traditional sayings, will not stand close investigation.

Operations of the Patent-Office.—The annual report of the Commissioner of Patents for the year ended December 31st, 1884, has been handed to the Secretary of the Interior. That part of the report that relates to the finances of the bureau shows that there were received during the year from all sources $1,075,799, and that there were expended $970,580, an excess of receipts over expenditures of $105,219. A summary of the work of the office for the year shows that there were issued 20,297 patents and designs, that 116 patents were reissued, and that 1021 trade-marks and 513 labels were registered; 12,301 patents expired during the year, and patents were withheld in 2839 cases for non-payment of the final fee. Of the patents issued, 19,013 were to citizens of the United States and 1284 to citizens of foreign countries. The Commissioner again calls attention to the inadequacy of room and of facilities for conducting the business of the office, and to the unfitness of the rooms now occupied for occupation by human beings. He also calls attention to the insufficiency of the facilities for conducting examinations, and recommends that an appropriation be made for a laboratory and such appliances and fixtures as are necessary. He asks that the force of examiners be largely increased, stating that the present force is inadequate. In connection with this matter he says: Many important interests are lost or greatly damaged by reason of the inability of inventors to have their applications disposed of within a reasonable time.

FINE CRUSHING.

The demand for fine crushing machinery, simple in design and operation, to replace, to a certain extent, Cornish rolls or stamps, has led to the development of a number of machines, one of which, manufactured by the Beckett & McDowell Manufacturing Company, we illustrate to-day. The principle adopted is the same as that of the Dodge crusher. An eccentric shaft gives movement to a pitman, which, at the bottom, moves in vertical guides. One toggle-plate acts directly upon one jaw, which rocks on its shaft, while the other imparts motion to a cast-iron cross-bar, which is connected by strong wrought-iron ties with another cross-bar, which rocks the second jaw on its shaft. Between these jaws, is set a stationary jaw, making two long discharge openings, the width of which can be altered at will.

Generally, one or more of these machines is arranged to work with a coarse crusher of the Dodge type. The product of this latter, reduced



say to pea size, and finer, may be fed directly to the fine crusher, or after screening, the coarser particles only going to the fine crusher. The movement of the jaw results in a combined crushing and grinding, which reduces a large percentage of the material to the ultimate fineness required, while the rest takes a second trip, after elevation through the crusher. By this system, it is claimed that the wear and tear upon all the working parts are reduced to a minimum. The machine is not only simple but inexpensive.

QUICKSILVER REDUCTION AT NEW ALMADEN.*

By Professor Samuel B. Christy.

(*Continued from page* 158.)

IV. FURNACES.

CONSTRUCTION, OPERATION, AND RESULTS.

No. 6.—COARSE-ORE FURNACE (INTERMITTENT).

Number of Runs.	Number of days firing.	Granza, tons.	Terrero, tons.	Tierras, tons.	Total ore, tons.
Thirty-one runs	138·08	2,259·30	297·600	183·650	2,740·550
Per run	4·45	72,881·00	9·600	5·924	88·405
Per ton of ore	.....	.....	.....	.....	.....

Number of Runs.	Quicksilver (flasks).				Wood burned, cords.	Cost of fuel.	Cost of labor.	Total cost.
	Condensers.	Soot.	Total.	Per cent.				
Thirty-one runs.	5,108	24	5,132	7·16	413·50	$2,425.87	$1,324.50	$3,750.37
Per run	.....	.....	165·548	7·16	13·339	78·254	42·726	120 98
Per ton of ore	.....	.....	1·873	7·16	0·151	0·885	0·483	1·368

In order to make a comparison of the merits of the different furnace systems in use at New Almaden, I have given the actual working results of each of them for the year 1882. Thus, the actual results obtained from No. 6 are given the foregoing table. This was made up from the admirable system of furnace records kept at the *hacienda*.†

Thanks to the Hüttner and Scott furnace, it is no longer necessary to treat *tierras* in the intermittent furnace. If it were necessary to treat a full charge of adobes, this would, according to the results for 1875, add 95 cents per ton to the present cost of $1.37, or nearly 70 per cent to the present cost of roasting in the intermittent furnace.

CONTINUOUS COARSE-ORE FURNACES.

Furnaces No. 7 *and No.* 9 (*see* illustration, page 157, March 7th).—This pair of duplicate structures is, with some slight improvements of detail,

* A paper read at the Philadelphia Meeting of the American Institute of Mining Engineers, September, 1884.

† It should be stated that the ruling prices at New Almaden during 1882 were as follows:

Furnace hands	$1.25 to $2.50 per shift of twelve hours.
Coke (English)	15.00 per ton of 2000 pounds.
Charcoal	12.00 per ton of 2000 pounds.
Coal (bituminous)	8.94 per ton of 2000 pounds.
Wood (pine or oak)	5.75 to $6 per cord.

the same as the continuous coarse-ore furnaces introduced at Idria, Austria, by Bergrath Exeli, from the model of the old Rumford lime-kiln. They are coarse-ore shaft roasting-furnaces with exterior firing.

The lower half of the furnace is a regular hexagon with abutments at the alternate sides. These abutments contain the fire, ash, and draw-pits. Each abutment has on its face a fire-door and an ash-pit door, which latter also commands the discharge-door for the spent ore. The spent ore, after being drawn from the cooling-pit of the shaft into the ash-pits, is left there until its fumes are exhausted, and is then drawn into the slag-cars through discharge-doors. These discharge-doors are placed on the side of each of the three abutments, lower down the ash-pit doors.

The upper half of the furnace is cylindrical. It is closed at the top by a flat dome that contains the charging apparatus in the center. The fumes of the furnace are removed from the vapor-chamber at the top of the shaft above the surface of the ore, by means of iron pipes 12 inches in diameter. In No. 9, there are three of these discharge-pipes, one of which is placed at the top of the shaft on the side opposite each fire-place. In No. 7, there are, in addition, three others placed at the top of the shaft, one above each fire-place. By means of short cast-iron pipes, these holes are connected with a cast-iron down-take by means of a rectangular system of pipes that encircles the head of the furnace. These pipes, inclined downward at an angle of 10 degrees, lead into the condensers. To keep the pipes clear of soot, they contain small disks of iron. These disks are moved by iron rods, passing through stuffing-boxes at the angles of the pipe system. They are only occasionally used, and the piston-rods are luted with clay when not in use.

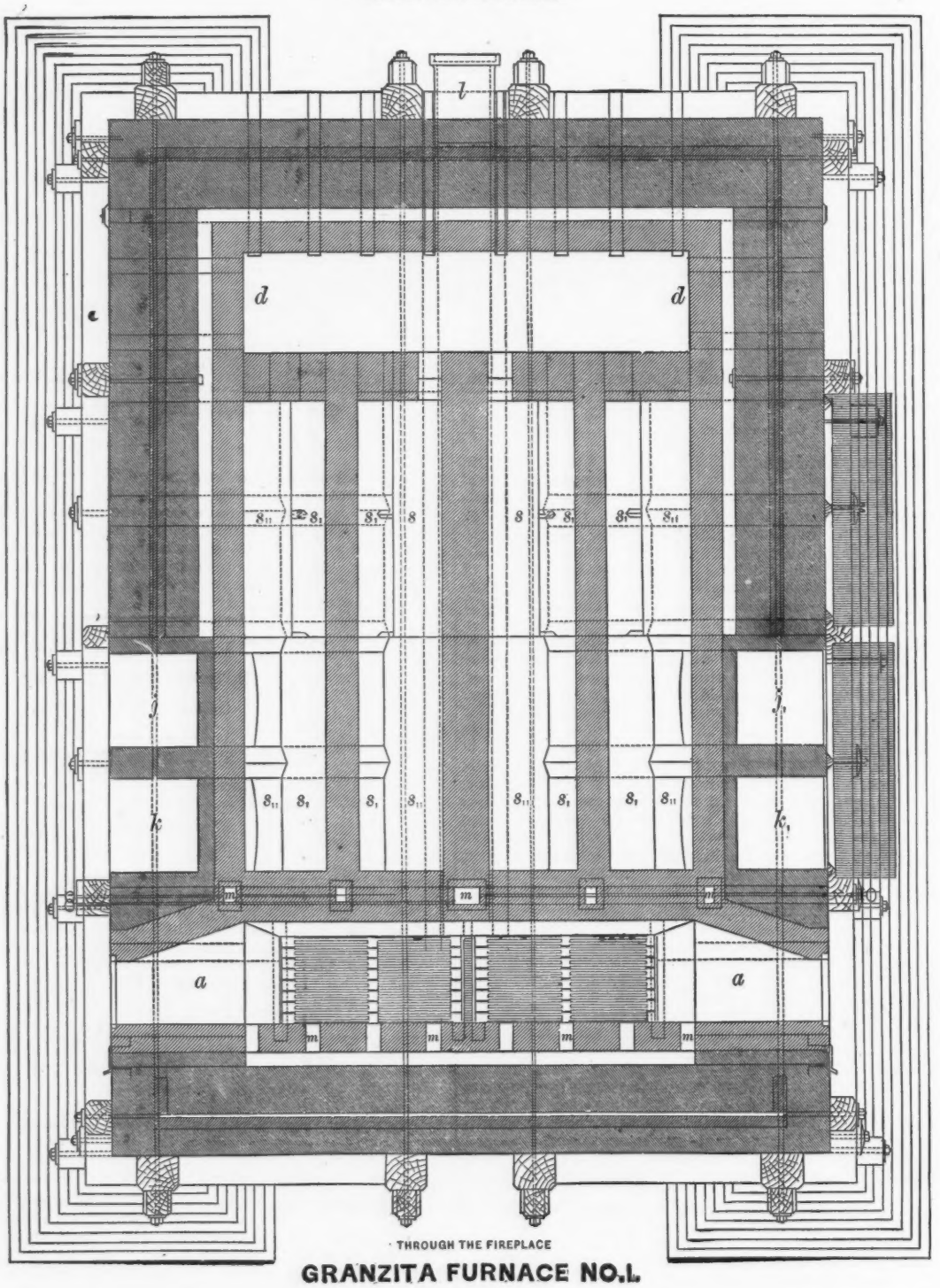
The shaft itself is a cylinder, 6-foot interior diameter, by 11 feet 3 inches high, joined to the frustum of a cone 8 feet deep, contracting to a diameter of four feet at the bottom. Along the sides of the cylindrical part of the shaft, opposite each of the fire-places, is placed a series of 4 peep-holes. These, ordinarily closed gas-tight, are used to determine the hight of the ore-column and its temperature.

The fire-places and discharges have the details common to well-designed continuous shaft roasting-furnaces of this type. The shaft and fire-places are lined with fire-brick; the rest of the furnace is of red brick, with the usual expansion space between.

The entire structure rests on a slightly cone-shaped iron plate that crowns the foundation. This causes any quicksilver that might permeate the masonry to flow to the center of the furnace-bottom, where provision is made for receiving it. Experience shows, however, that this precaution is hardly necessary, as no metal has ever reached it.

The lower half of the furnace is inclosed by cast-iron plates, bolted and

HORIZONTAL SECTIONS
THROUGH THE FIRST AIRCHAMBER



THROUGH THE FIREPLACE

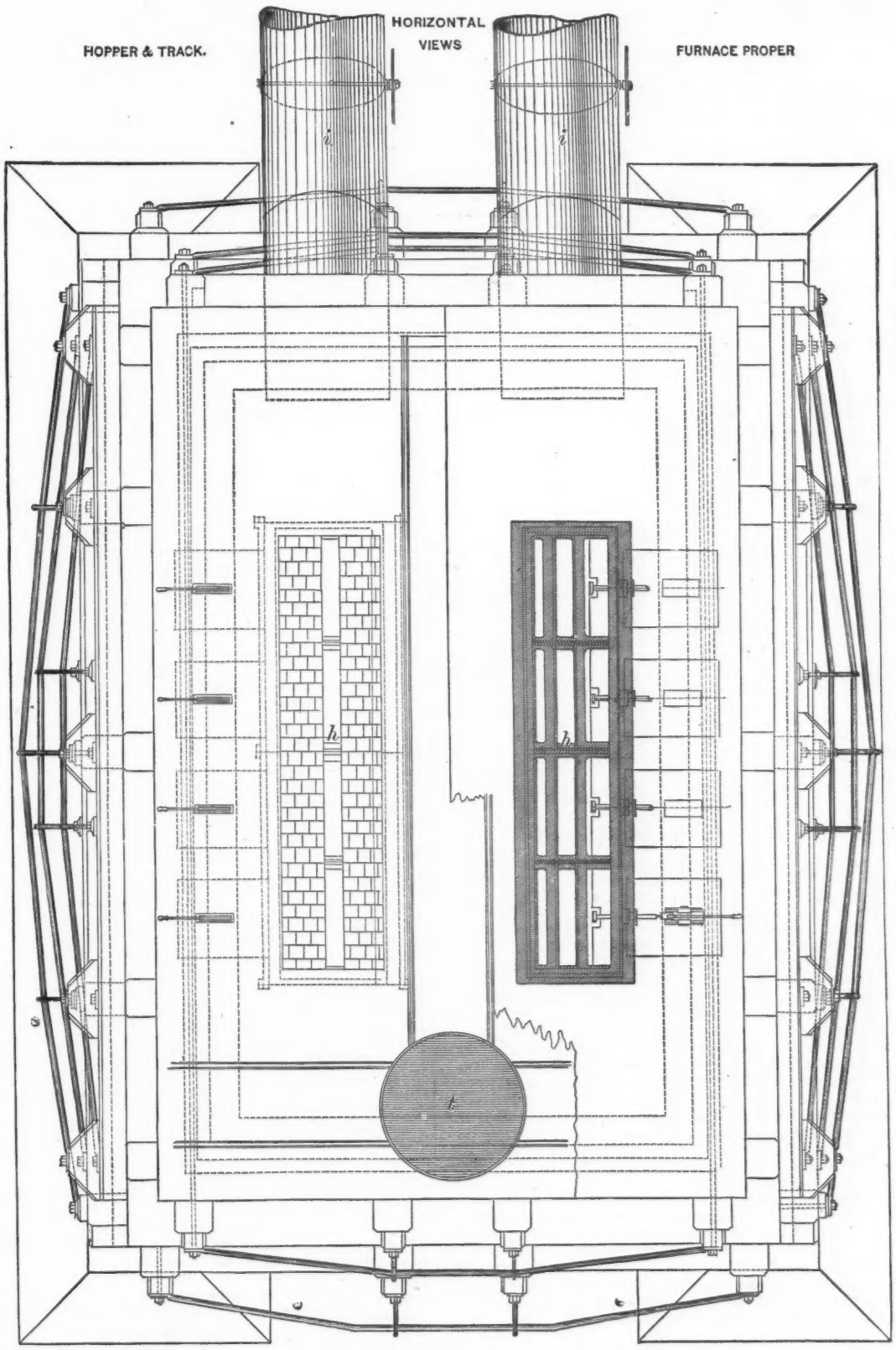
GRANZITA FURNACE NO. I.

SCALE ¼ INCH TO ONE FOOT

cemented with rust joints. The cylindrical part has a jacket of ¼-inch sheet-iron; and a cast-iron top plate crowns the whole, and makes the furnace vapor-tight.

The charging apparatus consists of a combination of devices used in iron smelting, namely, the hanging cylinder, cup, and cone. But, owing to the value and poisonous nature of quicksilver fumes, an additional cylinder and cover, with water or sand-joint, is introduced above the other devices (section *A B*). The rod moving the cone passes gas-tight through a stuffing-box in the center of the cover, and is attached to a balance-weight. The cover itself is also attached to balance-weights by two chains passing over pulleys. The charging is thus easily effected without exposing the men to the fumes. The cover is lifted; a charge of ore and a little fuel is dumped from the ore-car into the hopper, and the cover is lowered into place. The charge is then allowed to warm in the hopper, till it has nearly assumed the temperature of the top. This is done to avoid chilling the fumes and condensing them in the furnace by contact with cold ore. At the proper time, an equal volume of spent ore having been meanwhile drawn below into the ash-pits, the cone is lowered and the charge dropped into the furnace. The small quantity of fumes that escapes into the space between the cup and cover is allowed to cool a few minutes, and the cover is again lifted and a new charge is added to the hopper.

These furnaces were erected under the immediate supervision of Mr. H. J. Hüttner. The details of construction are throughout excellent; they work admirably, and, although they have been in almost continuous operation for nearly ten years, they have required hardly any repairs.



The mode of operating these furnaces is as follows: when first started for a campaign, they are filled above the level of the fire-places with spent ore, and then with ore to just below the level of the uppermost peep-hole. This level is never exceeded; so that there is always above the level of the ore a vapor-chamber, at least three feet high, containing 140 cubic feet, in which the fumes collect before passing out of the exit-flues With the ore when charged there is mixed 1½ per cent of coal, charcoal

or coke, to assist in raising the temperature at the top of the furnace and to keep the ore-column more open. A good fire of pine or oak is maintained in each of the three fire-places. The charge of 1600 pounds of ore and 24 pounds of coke or other fuel, previously weighed on the ore-scale, has been placed in the hopper. As soon as the lower peep hole shows a dull cherry-red, a quantity of spent ore is drawn into the ash-pits, the new charge is lowered into the furnace, and the hopper is refilled as before described.

The spent ore is allowed to remain in the ash-pits, discharging any fumes that may be still retained back again through the fire-place into the furnace. At the end of this period, it is drawn through the side doors of the abutments into the "slag"-cars. Another

NO. 9.—GRANZA FURNACE (CONTINUOUS).

REMARKS.	Number of days run.	Granza, tons, at 2000 pounds.	Quicksilver (flasks). Condensers.	Soot.	Total.	Per cent.	Wood burned, cords.
1882.	34·442	3,296·000	5,765	299	6,064	7·037	212·37½
Per day	1	9·570	.....	.....	17·606	7 037	0·617
Per ton of ore	.....	.....	.....	.....	1·844	7·037	0·064

SUMMARY OF GRANZA FURNACES.

Furnace No. 7	350·00	3,348·80	5,910	195	6,105	6·970	208 00
Furnace No. 9	344·42	3,296·00	5,765	299	6,064	7·037	212·37½
	694·42	6,644 80	11,765	494	12,169	7·000	420·37½
Per ton of ore	.....	.....	.....	.....	1·831	7·000	0·063

REMARKS.	Coal, charcoal, coke, pounds.		Cost of fuel.	Cost of labor.	Total cost.
1882.	Coke.... 37,248 Charcoal 35,136 Coal... 26,496	98,880	$1,800·73½	$1,317 500	$3,118·23½
Per day	Coke.... Charcoal Coal.....	287·091	5·228	3·825	9·053
Per ton of ore	Coke.. Charcoal Coal.....	30·000	0·5463	0·3997	0·946

SUMMARY OF GRANZA FURNACES.

Furnace No. 7	113,064	$1,858·91½	$1,353·75	$3,212·66½
Furnace No. 9	98.880	1,800·73½	1,317·50	3,118·23½
	211,944	$3,659·6500	$2,671·2500	$6,330·9000
Per ton of ore	3·189	0·5507	0·4020	0·9527

charge, equal in volume to the new charge, is again drawn through the discharge-holes of the shaft into the ash-pit, and then the new charge is dropped from the hopper into the furnace. This series of operations goes on every two hours as long as the campaign lasts.

At this rate, these furnaces roast 9⅛ tons per twenty-four hours, and, as by actual experiment they hold 21 tons, it takes 52½ hours for a charge of ore to pass through the furnace. The capacity of these furnaces might easily be increased by drawing and charging more frequently or in greater quantities, and with poor ores this would be advisable; but with the rich ores (6 to 8 per cent) now treated in these furnaces, experience has led to the above practice.

The amount of labor required for these furnaces is very small. Two men per shift of twelve hours charge and discharge both of them.

The foregoing tables show the actual furnace records of furnaces 7 and 9 for the year 1882. The total amount of ore treated, of quicksilver produced, and the expenses, are given; also, the expense per day and per ton for each furnace, and the average for both.

In comparing these furnaces with No. 6, it must be remembered that both the former are run with the same amount of labor that would be required for one of them if run singly. If two such furnaces as No. 6 were run together, while it would, of course, take double the labor to charge and discharge them, the same men could fire them both during the whole time of roasting. So, if we should compare two such furnaces as No. 6 with two such as No. 7 or No. 9, or if we compared No. 6 with either No. 7 or No. 9, working alone, we should have a more favorable showing for No. 6 than is here given. As it is, the cost of treating a ton of ore in No. 7 or No. 9, when both are run together, is only 70 per cent of that of roasting in No. 6 when the latter is run by itself.

CONTINUOUS FINE-ORE FURNACES.

The great importance of finding some economical method of treating the large product of poor smalls produced by the mine has been already explained. Making this ore into adobes would add 70 per cent to the cost of treatment in furnaces of the type of No. 6, and would double the expense of treatment of these ores in Nos. 7 and 9. The reverberatory furnaces (*Fortschaufelungsöfen*) used at Idria would equally be out of the question, at the high prices for labor and fuel that obtain in California.

We have already traced the gradual growth of the Hüttner and Scott furnace, and sketched the successive stages that the invention has reached. Now, for convenience in description, the furnaces will be taken up in the inverse order, the last built being considered first.

Continuous Granzita Furnace No. 1.—This is shown on page 159, on a scale of one quarter of an inch to one foot. In the *horizontal sections*, are shown, in the upper half, the horizontal section through the first air or vapor-chamber, and, in the lower half, the one through the fire-place.

The fire-place *a a* is arranged for burning wood, and is fed from both ends. An earthenware pipe *l l*, 16 inches interior diameter, passes through the condensers, thus cooling them, and feeding the fire place with warm air. From *l l* run also a series of air-ways *m m*, built in the walls of the fire-place and of the ore-chambers, thus cooling them, and supplying air for the more perfect combustion of the flames.

In the upper section, is the lower air or vapor-chamber *d d*, and between this and the fire-place are the four vertical air-chambers into which the furnace is divided. The shelves are shown at s, $s_{,}$, $s_{,,}$, $s_{,,,}$.

The discharge or draw-pits *j*, *k*, are fitted with counterbalanced doors, to retain the dust, and they feed upon an apron, and thence into the waste-car.

The horizontal dimensions of the furnace at this section, exclusive of the foundations, are 17 feet 6 inches by 25 feet 6 inches. The vertical hight from the top of the furnace masonry to the ground-line is 36 feet; the foundation goes down 7 feet 6 inches deeper.

The *horizontal views* show the furnace-top with ore-tracks and turn-table *t*, and the two feed-hoppers *h h*, each arranged with four slide-valves moved by levers and pistons working in stuffing-boxes vapor-tight.

The two vapor-discharge pipes *i i*, provided with regulating valves, and leading from the last vapor-chamber of the furnace to the condensers, are also shown.

The illustration to be given next week shows a half side elevation and a half longitudinal vertical section; the cut on page 159, given March 7th, shows vertical half-sections through the fire-places and ore-chambers.

The vertical section through the fire-place *a* shows also the ash-pit *b*, and the second vapor-chamber *e e*, on that side of the furnace. All along the vertical wall, between the fire-chamber *a*, and the vapor-chamber *e e*, and the ore-chambers beyond the plane of the section, are shown pigeon-holes *c c*, through which the flames and vapors from the ore pass into the ore-chamber and out of it again. The pigeon-holes in the fire-chamber walls are cut at the bottom so as to slant with the shelves, those in the vapor-chambers are cut across horizontally; but all are so beveled that the ore from the ore-chamber and the dust from the gases do not accumulate so as to obstruct them. The former is shed back into the ore-chamber, and the latter falls to the bottom of the vapor-chambers, whence it is removed at the end of the campaign by the doors *g*, kept bricked during the run.

In case any obstruction should occur in the pigeon-holes, or on the shelves, peep-holes *x x* are placed in the end walls of the furnace, in the axis of the pigeon-holes. These latter are placed in the same line opposite each other, under the extreme ends of each shelf. The peep-holes are made of 3-inch gas-pipe, set in the masonry wall, and are ordinarily closed by iron plugs luted with clay. When any obstruction occurs, it is thus easily removed by an iron bar introduced through these holes.

The air-pipe *l*, before mentioned, is shown below the grate-bars. Branching from it, and leading to the pigeon-holes, are the hot-air flues *m m*, which cool the wall, and help to render combustion complete, thus dimishing the production of soot.

The vertical section through the two right-hand ore-chambers of this figure shows the arrangement of shelving and the descent of the ore more clearly than words.

The horizontal length of the ore-chambers of this furnace is 11 feet 6 inches, the width of each 25½ inches, and their hight 27 feet 3 inches from the roof of the ore-chamber to the point of discharge.

The tile-shelving of this furnace, as in others of this type, is placed at an angle of 45 degrees with the side-walls of the chamber; the details, however, are simpler and cheaper than in the rest, and equally effective. It will be noticed that the shelves are placed 30 inches apart vertically, those on one wall being 15 inches above those on the other wall, and at right angles to them. The shelves are made of ordinary fire-clay tiles, 36 inches by 16 inches by 3 inches. Four of these make a length, and allow a 3-inch projection into either end-wall. These tiles are not let into the side-walls, but are supported at the top by slight abutments that project from the side-wall. At the bottom, they rest at intervals of 18 inches on ordinary fire-bricks, which rest, end on, in depressions 1 inch deep, cut into the face of the next lower tile in the opposite wall. These bricks are placed so as to be edge on to the descending column of ore, and have their upper edges beveled to oppose as little resistance as possible to it. As the bricks are 9 inches long, there results an 8-inch shelf slit for the furnace. The whole construction of the shelving is very simple, effective, and comparatively inexpensive.

The discharge of this furnace is arranged by supporting the end of the ore-columns of the interior ore-chambers directly on the bottom of the draw-pit; the ore-columns of the exterior ore-chambers are supported by cast-iron plates. The latter have in front aprons, which discharge the ore into the lower draw-pits, and thence the spent ore from both chambers is raked into the waste-cars.

This simple arrangement works very well. The ore lies at its natural slope until it is raked out, when the whole ore-column gradually feeds down from bottom to top at the same rate. There are four double discharges on each side of the furnace. These are closed by sheet-iron doors to protect the workmen as much as possible from the hot dust.

Inclined iron plates are placed in the foundations of the furnace to prevent the waste of mercury. This precaution is now always taken in building.

The illustration to be given next week shows a vertical longitudinal half-section and front or side elevation. Both fronts—the long sides—of the furnace are the same. From the fire-chamber *a*, the hot gases pass through the lower third of the ore-chambers to the vapor-chambers *d d*, shown on the left in dotted lines; thence they pass through the middle third of the ore-chambers to the vapor-chamber *e e*, on the right; thence they pass out through the top third of the ore-chamber again to the vapor-chamber *f f*, on the left, and thence out through the sheet-iron pipes *i i*, to the condensers.

This section shows alternately the right and left shelves s, and s, of the inner ore-chamber. The bottom shelf $s_{,,,}$ is made of cast-iron, to resist the abrasion that comes upon it; it is not as much exposed to heat as are the upper shelves.

Finally, are to be mentioned the ore-rakes. The New Almaden ore gives no difficulty from fusing or clotting; but occasionally in the winter, or when the ore is quite damp, it is found to bake together on the upper shelves so as to demand more or less barring through the peep-holes. To obviate this, Mr. Randol introduced the ore-rakes, marked *r* in the figures. One of these rakes extends through each of the ore-chambers just above the topmost shelves, where the ore enters the furnace from the hoppers. If any baking occurs, a few oscillations of the rake break up the clumps, and the ore descends regularly.

Furnace No. 1 has a capacity of 36 tons per twenty-four hours. Its capacity is greater than that of any other furnace at the works except *Tierra* furnace No. 3. When filled with ore, as in working, No. 1 holds 45 tons; hence, at the rate of 36 tons per twenty-four hours, a single charge is in the furnace for thirty hours.

The routine of operations at this furnace is as follows:

The amount of 1 ton by volume* of the spent ore is drawn alternately from either side of the furnace every 40 minutes, or in all, 2 tons (by volume) are drawn from the furnace every 80 minutes. As a rule, 250 pounds are taken from each of the 8 draw-pits on each side of the furnace at the times of drawing; but, if the regular working of the furnace demands it, this quantity is reduced or adjusted, so that all shall be thoroughly roasted. The "slag-men" thus have to draw and wheel to the dump 2 tons of waste every 80 minutes.

Immediately after drawing from one side of the furnace 2 car-loads of *granzita*, of 1000 pounds each, 20 pounds of coal are charged into the furnace from the hopper on the side from which the drawing took place. The hopper is then immediately filled for the next charge, both to warm the ore and to prevent the escape of fumes. Consequently, each of the two hoppers is charged alternately every 40 minutes, or in all 2 tons go into the furnace every 80 minutes.

The firing is done every hour; three four-foot lengths of oak or pine being ordinarily added to each side of the fire-place per hour. The amount varies with the state of the draught, the object being to keep the fire-place a good cherry-red. From 1½ to 1¾ cords of wood are burned per twenty-four hours, according to whether an auxiliary fire is made in the flue or not.

NO. 1.—GRANZITA FURNACE (CONTINUOUS).

REMARKS.	Number of days run.	Granza,* tons.	Granzita, tons.	Total ore, tons.	Quicksilver (flasks). Condensers.	Soot.	Total.	Per cent.
Per day.....	215	425·75	7,165.50	7,591·25	2952	322	3,274	1·664
Per ton of ore.....	1	1·98	33·328	35·308	13·73	1·50	15·23	1·664
	.....	.....	.....	.....	.....	.....	0·431	1·664

REMARKS.	Wood burned, cords.	Coal or charcoal, lbs.	Cost of fuel.	Cost of labor.	Total cost.
Per day.	344·75	149,040	$2,669.71	$2,186.78	$4,856.49
	1 603	693·209	12·417	10·171	22·588
Per ton of ore.....	0·0455	19·633	0·352	0·288	0·640

* Really granzita proper, that is, screenings of granza from *hacienda* ore-bins.

When No. 1 furnace is worked alone, the labor required is as follows:

One charger, at $2.50 per 12-hour shift.

Two slag or fire-men, at $1 25 each per 12-hour shift.

In addition, the labor of two men at $1.25 per day, who tram ore across from the ore-chutes to the furnace, is charged to it part of the time. Besides firing the furnace and discharging the ore, the fire and slag-men pile the fuel, send the ore up the elevator to the charger, and assist the weigher in weighing the quicksilver and tightening the flask-stoppers.

The results of this furnace for 1882 are given in the foregoing table.

Continuous Granzita Furnace, No. 2.—Its construction and mode of operation are similar to those of No. 1. But, having only two ore-chambers, its maximum capacity is only half that of the former; its discharging arrangement is simple also, owing to the small number of ore-chambers. This would make the working capacity of the furnace 18 tons per twenty-four hours.

No fuel is charged with the ore of No 2, but, instead, coal is used in the fire-place. The consumption of fuel is ¾ cord of wood and 500 pounds of coal per twenty-four hours.

When No. 2 furnace is run alone, there are employed: One charger and two fire or slag-men per 12-hour shift, or six in all, per twenty-four hours. When No. 1 and No 2 are both in operation at the same time, labor is economized by running them with the same force. For this purpose are assigned:

One charger, at $2.50 per 12-hour shift.

Four slag or fire-men, at $1.25 per 12-hour shift.

In addition, two men are employed part of the time to bring the ore from the chutes to the furnace-bins.

Furnace No. 2 is not always run up to its full capacity, only enough ore being run through it to make up the desired monthly production.

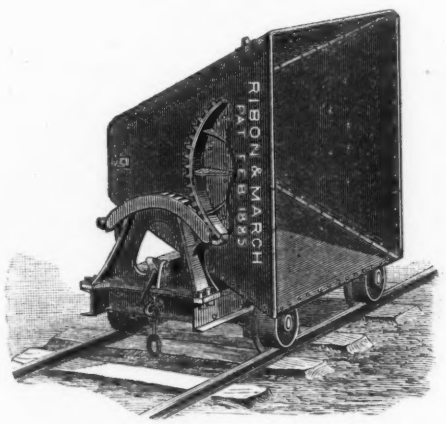
TIERRA FURNACES.

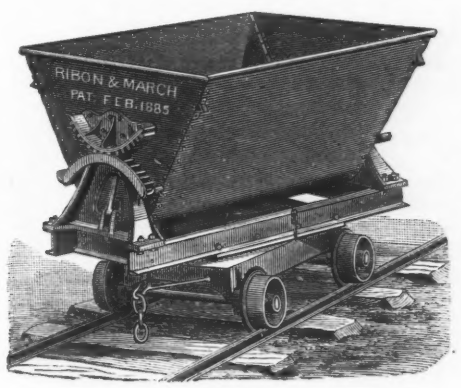
Furnace No. 3.—This is arranged on the same general plan as Nos. 1 and 2, but is an earlier construction. It has three pairs of ore-chambers, placed side by side. This fact necessitates a different discharging arrangement from that used in Nos. 1 and 2. As previously stated, the two outer pairs of ore-chambers for roasting *tierras* have 3-inch shelf-slits, while the inner pair, originally intended for granzita, have 5-inch shelf-slits. They are now all used, without alteration for roasting *tierras*.

The feed-hoppers, fire-place, pigeon-hole walls, vapor-chambers, and ore-rakes, are entirely similar to those of furnace No. 1, and need no further remark.

NOTE.—In our last issue, on page 157, we published drawings of the shaft-furnace No. 7; and on page 159, a vertical section of the *granzita* furnace No. 1, the ground-plan and horizontal section of which we give this week. In our next, we shall present another vertical section.

(TO BE CONCLUDED.)





A NEW DUMPING-CAR.

We illustrate herewith a new dumping-car that possesses some points of interest. It has recently been patented by Messrs. Ribon & March, of Jersey City, N. J., who make the following claims for this convenient and simple car:

The weight is carried and supported by a continuous bearing, constructed in a single piece, of greater strength of attachment, less liable to displacement, and so balanced that a child may tip the body, and very much adding to the durability of the car, which under the heavy jar in the dumping of the other styles is very soon wrecked and got out of order.

These cars are entirely made of iron and of the very best material and workmanship. The swivel cars as illustrated are two-foot gauge, body 3 feet 3 inches wide by 3 feet 5 inches long at the top, and stand 3 feet 5 inches high on the track. The truck is 2 feet wide by 4 feet 5 inches long, weighing complete 750 pounds.

The plain side dumper has the same dimensions as the swivel car, but only stands 3 feet high on the track, and weighs 575 pounds.

The first car represents a swivel dumper, available both for side or end dumping. The second is a plain side dumper only, and not available for end dumping. All have a patent cam lever lock attachment at each end of the body, not necessarily to use both at the same time, but in order that the rear end of the car in use at the time only be locked, to avoid loss of time by the workman having to pass to the other end of the car to unlock the body.

This is a very simple and effective device for holding the car box in an upright position, readily opened to allow the tipping of the body and load. It can not get out of order or become unlocked accidentally.

The Surveyors and Civil Engineers' Association of Iowa.—The Iowa civil engineers and county surveyors met at Des Moines, organized under the above name, and elected the following officers for the ensuing year: President, R. J. Stoddard, of Makaska County; First Vice President, F. L. Easley, of Webster; Second Vice-President, Morris McHenry, of Crawford; Treasurer, Frank Pelton, of Polk; Secretary, W. R. Laird, of Polk.

* The *granzita* and *tierra* ores are not weighed at any of the furnaces, but are estimated by volume. This method, on account of the varying amount of moisture in the ore, probably gives better results than weighing without allowing for the moisture, and is sufficiently exact. The volume of the roasted ores is nearly the same as that of the raw ores in the case of *granzita* and *tierras*. With rich *granza*, it is sometimes notably less. In any such case, the amount drawn is diminished, so as to keep the furnace full. It would not do in such cases to increase the amount or frequency of the charging, as that would lead to a loss of quicksilver. The roasted ores contain a larger proportion of smalls than the raw ores, are more brittle, and have a rusted, earthy appearance.

THE MINING INTERESTS OF CHILI.*

By J. Clemente Castro.

The mineral belt of Chili extends from the 24th to the 50th degree south latitude, and from the Andes dividing the country on the east from the Argentine Republic to the Pacific ocean on the west, a width of 120 miles. In the desert of Atacama, north of Chili, in all directions; in the crests of the Andes, towering to the hight of fourteen and sixteen thousand feet; also, far south in Patagonia and Terra del Fuego, and even in the central valleys and the country along the ocean—in all these regions are found the centers for the mining of gold, silver, lead, copper, etc.

From the year 1832 to the present, the provinces of the north, Atacama, Coquimbo, Aconcagua, Valparaiso, and Santiago, which extend successively southward, having the Pacific on the west and the Andes on the east, have been those that have exploited the greatest quantities of rich ores, especially gold, silver, and copper. The value of these metals mined during the last fifty-two years has amounted to six hundred millions of dollars, more copper being taken out than silver, and more silver than gold.

The mines have generally been worked by their owners, with modest resources; in few instances, has the necessary capital been employed for the development of the mining industry, the general tendency being to get immediately the greatest results, putting aside the more judicious method of working for the future of the industry.

As is well known, there are irregularities in all large veins, and it is convenient, almost indispensable, to have a regular system not only for extracting the mineral in sight in a quick, easy, and economical way, but also for pushing forward the workings to greater depths, in order to have a larger field for exploitation. At the same time, there should be a minimum of expense. Without this preparation, it is only possible to obtain the cream of the deposit, making the future work immensely expensive and difficult.

In Chili, the 2000 mines that are worked to-day have been worked without regularity, not looking to the future and without competent engineers in charge. This I say generally, since there are many mines in which this provision has been made, where good machinery has been placed, and where the direction is by competent engineers. These mines are the only ones that may be said to permit advanced exploration in the barren rock at a moderate cost, and to allow the working at a depth of from 1500 to 2000 feet of ores of such low percentage that in poorly conducted mines even on the surface they would not pay to work.

COPPER.

During the last ten years, there have been no new discoveries of copper ores: and the yearly production of 40,000 tons that in ores, mattes, or bars have generally been exported to England, have been obtained from the old mines, worked as already described. The average fluctuation of these ores has run between 15 and 30 per cent. The depth from which the ores are raised by mule power, or carried on men's backs, varies between 100 and 600 feet. With such elements to contend against, and with such depths from which to raise the ore, the working has become so expensive that, on account of the low price reached by copper during the past ten years, many mines have been obliged to stop work.

The mineral veins in Chili are generally of great extent, often many miles long, without following a fixed direction. In width, they are from two to thirty feet. The workings produce an ore according to location from 15 to 40 per cent; in those in the best location, on account of being near to the smelting establishments, 10 per cent ores are considered good, if the ore is abundant. As a rule, the ores lower than 10 per cent are considered as unexploitable, since there is no market in which to sell them. This latter applies also to the low-grade ores of gold, silver, and lead, owing to the cost of exploitation and the high rates of freight to smelting establishments.

The exploitation of the ore in the mines is exclusively done by hand power, using as explosive ordinary powder. There is thus necessarily a large number of workmen employed, and the output of ore is limited in quantity.

METALLURGICAL ESTABLISHMENTS.

The metallurgical establishments generally do not occupy the most central positions in the mining region, owing to the fact that the transportation of the fuel to the mines is more difficult and expensive than sending the ore down to the point selected for smelting. All these circumstances have caused heavy charges for the smelting and treatment of the ores, resulting in the treatment of but few ores, which, though having a good percentage, can not stand the many expenses of exploitation, etc.

The metallurgical process for copper is generally the same as is pursued in Swansea for treating mattes and obtaining bars of from 84 to 86 per cent; in three special localities, where every thing was favorable, shaft-furnaces of the Pilz system, with some changes, have been erected, mattes of from 60 to 70 per cent being obtained.

The gold and silver ores are treated as follows: 80 per cent by the amalgamation process of Mr. B. Krohnke, and the remaining 20 per cent by lead smelting and cupellation.

In silver, we have a notable array of ores; but in metallurgy we make only two classifications, namely, those that yield to amalgamation from white silver to the multiple arsenical and sulphurous ores that do not come up to 10 per cent of lead; and the multiple sulphurets, carbonates, etc., that contain a percentage of lead. These are treated by smelting with lead.

The copper ores that are exploited are oxidized ores, silicates, chloridized ores, etc., and sulphurets of multiple character or cupriferous pyrites, the percentage of sulphur varying according to location from 15 to 50 per cent.

What might be termed the Bessemer system of reduction and purification modified by Berthei, applied to copper in refining mattes, has already been established, and without doubt in a short time will be in general use in the metallurgy of copper in Chili.

After having visited all the most important mining centers of Chili, and studied the elements of labor, the abundance of minerals, and the means of giving life to this industry, I have reached the conclusion that, in order to give a new impulse to mining, there is only needed an earnest and intelligent effort, helped, however, by capital. The use of machinery in the working of mines, so generally employed here; of compressed air as a motive-power; of rock-drills instead of hand-labor—these, in connection with sulphuric acid chambers in the direct treatment for copper would make it possible to reduce ores exceeding one per cent in copper and 15 per cent in sulphur at a fair profit.

Counting upon an exceedingly large quantity of waste mineral, of virgin ore in veins that would surely be worked, we should obtain in Chili copper in any quantity needed at a price varying between 6 and 9 cents a pound in American gold.

After having visited great mining centers in this country as well as some of the most famous metallurgical establishments, I have come to the conclusion that, if the machinery for mine exploitation should be introduced and operated in the same judicious manner as is done by you, it would undoubtedly result in placing us on a level with or even raising us above you Americans, so that the metal copper could be produced on a large scale at a low price, since we have in Chili intelligent workmen receiving at least 50 per cent lower wages than you pay in your country; indeed, in many places, the amount is only one third of what is paid by you.

Chili needs, at any cost, American machinery for the development of her mining interests; and as soon as possible, companies should be organized, made up of the owners of the richest mines, together with ample capital for giving new impulse to their industry.

Without these, I am afraid that she will be displaced by Spain, Australia, and the United States, instead of having the lead, as until to-day she has set the price of copper to the world. This is also applicable partly to silver and lead mining, etc.

Knowing the hard-working, steady, and intelligent spirit of the mining men in Chili, I do not doubt but that very soon they will try to get from American manufacturers the enormous quantity of machinery that they need for their mines, and also erect modern metallurgical establishments in the ore-producing centers, if they are once sure of the profit obtained from the machinery that I will soon take to Chili to erect in the mines of Paposo. This will soon cause the spirit of association to be awakened among those who have a common interest.

In Chili, we have justly a great regard for all that comes from or is developed in the United States, and in order to strengthen the commercial relations that may be of immediate great interest, it is only necessary, in my judgment, to give suitable facilities that will result in the demand of Chili being thoroughly supplied by the manufacturers of the country sending good machinery at short notice and at a fair price. If this can be obtained, I believe that very soon American manufacturers will gain a market of immense proportions and a very paying one.

* This interesting letter has come to us through the courtesy of Messrs. Beckett & McDowell, of this city.

IMPROVED METHODS OF COKING COAL AND THE UTILIZATION OF BY-PRODUCTS OF COMBUSTION.*

Written for the Engineering and Mining Journal by R. W. P. Richardson, Scottdale, Pa.

As supplementary to my article on Improved Methods of Coking Coal and the Utilization of By-Products, as given by the Simon-Carvès coke-ovens, I beg to add the following details and remarks deduced from results obtained by various experimenters.

The chief objection to the coke from the Simon-Carvès oven appears to be its want of the metallic luster of the coke obtained from the bee-hive oven. The main use of coke is for blast-furnaces; the essentials for such use are undoubtedly purity, hardness, and density, and in these respects, as shown by various experiments, the coke from this oven takes the lead. Luster is a non-essential characteristic in pure or good coke, and this, in England, commands one shilling more per ton than any other coke.

We must also consider the enormous saving of coal, amounting to almost 25 per cent, and also the by-products, which, by careful manipulation, are daily giving more satisfactory results. The saving has been increased from 4s. 6d. per ton, as stated in my first paper, to 9s. per ton of coke for products recovered, and this at the low price paid in England for such products.

Improvements have been made in the ovens at Pease's West Works to such an extent as to increase their coking capacity from 368 tons to 675 tons per annum.

To illustrate the saving effected, take, for instance, some of the large manufacturing establishments in Europe, say a firm manufacturing 550,000 tons of pig-iron annually, working its own coal, and manufacturing coke in the ordinary bee-hive oven. The coke consumed in making that quantity of iron is about 630,000 tons. The value of the coal wasted and by-products wasted by using bee-hive ovens amounts, as at present shown, to the annual sum of £220,000.

In France, excellent coke is made by those recuperator ovens from small coals containing not more than 20 per cent of volatile matter. The recuperator also reduces the cost of labor, the services of the fireman being entirely dispensed with, the hot air being sufficient to keep the gas burning. The fire, which formerly had to be kept burning on the grate, in order to keep the gas ignited, is now extinguished after the ovens have been started. A still further advantage of the greater heat produced by the recuperator has been found to consist in the fact that the slack, when washing is resorted to, can be put in the ovens wet. By experience, it has been found that an increased production of ammonia is the result.

Although the waste gases have a considerable amount of their heat abstracted in producing hot air, they are still found to be capable of producing sufficient heat to raise steam in two boilers for driving the machinery necessary for conducting the process of extraction of by-products.

As regards the density of this coke, as compared with that of the bee-hive oven, according to Dr. W. A. Tilden the relative weight per bushel is: Bee-hive, 35 pounds; Simon-Carvès coke, 42 pounds. According to M.

* *See* ENGINEERING AND MINING JOURNAL for January 31st, 1885, page 71.

Jourget, the resistance per square centimeter in kilograms is: Bee-hive, 43·92; Simon-Carvès, 92·32.

We will now remark the chemical nature of the by-products as shown by the elaborate experiments of Dr. Watson Smith, of Manchester, England.

The distillation of tar is becoming one of our most important industries, and the application of chemistry is very satisfactorily furthering its progress.

The tar from the Simon-Carvès ovens contains anthracene and naphthalene in larger quantities than any other known tar, and the yield of benzine, toluene, xylene, and carbolic acid is equal to that of the best gas-tars. Its specific gravity is 1·200. Some of these constituents are in great request, and rank as important articles of commerce: their prices have been gradually on the rise.

As to the prospective value of the products, it is desirable to refer to that which is produced from use of coal in blast-furnaces and gas-producers. Dr. Smith shows clearly, in his paper read before the British Association, that tar produced by the Simon-Carvès process is of the greatest excellence and value; that obtained from blast-furnaces and gas-producers is of inferior quality, and will be used for purposes altogether different from those for which superior tars are required. As regards the ammoniacal liquor (averaging 7 degrees Twaddell), the question is simple, and no doubt remains but that the liquor should be treated at the works where it is produced.

If manufactured into sulphate, the cost of apparatus is moderate, the process simple, and it creates no nuisance. Assuming the liquor to be worth 1d. per gallon, it would be found that ammonia sulphate could be sold at 11s. per cwt. with profit, and at that figure there would be an unlimited demand for it for agricultural purposes. Its present price is £15 per ton, and nitrate of soda £11 per ton, the former being greatly preferred.

Ammonia liquor has also been used in the manufacture of soda, and Messrs. Solvay, the celebrated soda manufacturers, have made contracts with the Terre-Noire Company, in France, for its whole production, which they themselves concentrate at the Bessegès Works of the company, and which they send to their works at Nancy, a distance of 300 miles.

It may be well to make a few remarks on the coke business of these very complete works. They use here (as is usually adopted in England with the bee-hive oven) the surplus waste heat for steam-raising purposes.

Steam is produced to the extent of 45 pounds, and of 4½ atmospheres pressure per hour and per ton of coal coked.

M. Jourget, director of the works, says that, under favorable circumstances, 59 pounds could be obtained, that is, say 17½ pounds of steam necessary to produce one horse-power per hour. Each oven gives about 3⅜ horse-power of motive power, and could be driven to give 4⅜ horse-power.

At these works, all the machinery required in the manufacture of coke and its by-products is driven by steam raised in this way, and there remains a large surplus, used in the blowing-engines for the Bessemer process.

In conclusion, I give the following remarks by Dr. Smith on the tar obtained from these ovens:

The specific gravity of this tar, after due settling to get rid of excess of ammonia water, was 1·106. The smell and appearance of the tar were precisely those of normal gas-retort tar. There were distilled 2400 c. c.

Temp. cent	Vol. c. c.	Per cent by vol.	Remarks.
	Water 149	6·2	
Below 120°	Naphtha 39	1·6	
210°	70	2·9	
220°	30	1·3	
230°	13	·5	Nearly all solid naphthalene.
300°	446	18·6	Mixture of naphthalene and anthracene, with but little intermediate oils.
Above 300°	820	34·2	Nearly all solid crude anthracene. Comparatively little red oil.
	1,567		
Half coked 857 gms. pitch. . . .	807		
	2,374		
Loss.....	26		
	2,400		

At the close of the experiment, and after the retort had so far cooled as to be merely warm, on opening it the exhalation of ammoniacal fumes was such that it was scarcely possible to endure the odor at a distance of several inches from the unstoppered opening. The coke was found saturated with ammonia gas, even after it had been extracted from the retort. In spite of this fact, it is a question whether it would pay to coke pitch, and carry the vapors evolved into sulphuric acid for the manufacture of ammonia sulphate; for pitch commands at present a good price, and is an extremely useful article.

The benzole, naphthas, and carbolic acid were precisely the kind found in gas-retort tars; but the smaller quantities of benzine and naphtha with carbolic acid and largely predominating naphthalene and anthracene would place this variety of normal coal-tar on a level with the tars of the London gas-works. With naphthalene and anthracene, there is, singular to say, very little of the intermediate oils known as the "red" or anthracene oils, present in the Simon-Carvès oven-tar. Such a tar as this would be precisely the tar for alizarine manufacturers.

The vapors of benzine, toluene, and xylene, together with bisulphide of carbon and other products, may be recovered by suitable means from the gas, and the crude product afterward fractionated to separate the various valuable constituents from the mixture.

There were taken 2·077 gms. of the thick oil, and ·054 gm. of sublimed anthraquinone obtained; this represents 2·225 per cent of anthracene in the thick oil. The weight of tar taken was 2654 gms., and the weight of thick anthracene oil obtained was 881 gms. Hence the tar from Simon-Carvès coke-ovens contains 0·73 per cent of available real anthracene, which is comparatively a very large amount. Ordinary coal-tar shows 0·4 per cent, and that only when all the oils are worked up; that is, those distilling below as well as above 300 degrees C.

It will be readily seen, from the foregoing remarks, that, for the valuable products derived from the destructive distillation of coal, we are not now entirely dependent on the gas-works. but that they can all be economically produced by any manufacturer of coke, so that an operator, if getting nothing for his coke, would, by saving the by-products, be in a much better financial condition than in selling it at the present price, $1.25 per ton. It will therefore appear to every thinking person that to allow a golden opportunity for economy like this to be neglected would be utter folly. I have not attempted to show the saving that would result in this country, owing to the fact it has not been tested; but it can be easily understood that, for various reasons, it would be much higher.

I am anxious that these facts should be made public; and if it does not warrant an immediate change, at least let it be gradual, and let us not constantly adhere to the present prodigal methods of coking coal.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book-buyers, give the retail price!]

Mechanics of Engineering and of Machinery. By Dr. Julius Weisbach. Volume III. Part I., Section I. The Mechanics of the Machinery of Transmission. Second Edition, thoroughly Revised and greatly Enlarged, by Gustav Herrmann, Professor at the Royal Polytechnic School, Aachen, Germany. Designed as a Text-Book for Technical Schools and Colleges, and for the Use of Engineers, Draughtsmen, etc. Translated by J. F. Klein, D.E., Professor Mechanical Engineering, Lehigh University, Bethlehem, Pa. Authorized Translation. New York: John Wiley & Sons. 1883. 8vo, pages lxviii+544 (including Index) and 448 Wood-Cuts. $5.

Kinematics. A Treatise on the Modification of Motion, as Affected by the Forms and Modes of Connection of the Moving Parts of Machines. Fully illustrated by Accurate Diagrams of Mechanical Movements, as Practically Constructed; for the Use of Draughtsmen, Machinists, and Students of Mechanical Engineering. By Charles William MacCord, A.M., Sc.D., Professor of Mechanical Drawing in the Stevens Institute of Technology, Hoboken, N. J., etc. New York: John Wiley & Sons. 1883. 8vo, ix+335 (including Index) and 269+37 Wood-Cuts. $5.

Study on Reservoir Walls. By J. B. Krantz, Ingénieur en Chef des Ponts et Chaussées. Translated from the French by F. A. Mahan, Captain of Engineers, U. S. Army. Illustrated by 34 Plates, Comparing Sections of Dams Actually Constructed with the Profile-Types. New York: John Wiley & Sons. 1883. 8vo, pages 54. $2.

The Topographer, his Instruments and Methods. Designed for the use of Students, Amateur Topographers, Surveyors, Engineers, and all Persons Interested in the Location and Construction of Works Based upon Topography. Illustrated with Numerous Plates, Maps, and Engravings. By Lewis M. Haupt, A.M., C.E., Professor of Civil Engineering, Towne Scientific School, University of Pennsylvania, Author of Engineering Specifications and Contracts, Working Drawings, etc. J. M. Stoddart, New York, Philadelphia, and London. 8vo, pages xiv+184. (*No Index.*)

Indiana. Department of Geology and Natural History. (Twelfth Annual Report.) John Collett, State Geologist. To the Governor. Indianapolis. 1883. 8vo, pages 400 (including Index), and 38 Plates and 38 pages of Explanations.

State of Indiana. Fifth Annual Report of the Department of Statistics. 1883. To the Governor. Indianapolis. 1884. 8vo, pages 432.

Geological Survey of New Jersey. Annual Report of the State Geologist, for the Year 1883. Camden, N. J. 8vo, pages 187 (including Index), Frontispiece, Map, and Plates.

By-Laws and Rules of the Metal Exchange. 1883. 8vo, pages 43.

The Resources of the Rocky Mountains, being a Brief Description of the Mineral, Grazing, Agricultural, and Timber Resources of Colorado, Utah, Arizona, New Mexico, Wyoming, Idaho, Montana, and Dakota. By E. J. Farmer. Cleveland, Ohio. 1883. 12mo, pages 196.

Annual Statistical Report of the Secretary to the Members of the British Iron Trade Association of the Home and Foreign Iron and Steel Industries in 1883. Issued April, 1884. London: E. & F. N. Spon and British Iron Trade Association. 1884. 8vo, pages iv+157. (*No Index.*)

Catalogue of the Library of the Iron and Steel Institute. January 30th, 1884. London: 2 Victoria Mansions. 1884. 8vo, pages [ii]+54.

Patents on Inventions. A Quarterly Patent Law Review. Containing Information and Advice for Inventors, Patentees, and Manufacturers. Henry Connett and Arthur C. Fraser, Authors and Editors. Vol. I. New York: Burke, Fraser & Connett. 1884. Sq. 8vo, pages, xii (Index)+214+12 (Supplement).

A Treatise on Toothed Gearing. Containing Complete Instructions for Designing, Drawing, and Constructing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, etc., and the Proper Formation of Tooth-Profiles. For the Use of Machinists, Pattern-Makers, Draughtsmen, Designers, Scientific Schools, etc. By J. Howard Cromwell, Ph.B. New York: John Wiley & Sons. 1884. 12mo, pages ix+245 (Including Index) and 130 Wood-Cuts. $2.

Hints on the Drainage and Sewerage of Dwellings. By William Paul Gerhard, Civil Engineer. New York: William T. Comstock. 1884. 12mo, pages x+302 and 282 Wood-Cuts. (*No Index.*)

Practical Carpentry. Being a Guide to the Correct Working and Laying Out of all Kinds of Carpenters' and Joiners' Work. With the Solutions of the Various Problems in Hip-Roofs, etc. To which is prefixed a Thorough Treatise on "Carpenters' Geometry." By Frederick T. Hodgson. New York: The Industrial Publication Society. 1883. 12mo, pages viii+144, 154 Wood-Cuts, and 6 full-page Plates. (*No Index.*) $1.

A Practical Treatise on Lightning Protection. Giving Complete and Explicit Instructions for the Protection of Buildings and Explaining the Defects of the Lightning Conductors Now Erected. By Henry W. Spang. With Illustrations. New and Revised Edition. New York: D. Van Nostrand. 1883. 12mo, pages 63 and 19 Wood-Cuts. (*No Index.*) 75 cents.

Elementary Text-Book on Physics. By Professor William A. Anthony, of Cornell University, and Professor Cyrus F. Brackett, of the College of New Jersey. New York: John Wiley & Sons. 1884. 12mo, pages ix+246 and 54 Wood-Cuts. (*No Index.*) $1.50.

The Relative Proportions of the Steam-Engine: being a Rational and Practical Discussion of the Dimensions of every Detail of the Steam-Engine. By William Dennis Marks, Whitney Professor of Dynamical Engineering in the University of Pennsylvania. With Numerous Diagrams. Second Edition, Revised and Enlarged. Philadelphia: J. B. Lippincott & Co. 1884. 12mo, pages 215 and 45 Wood-Cuts. (*No Index.*) $2.

The Tenting School: a Description of the Tours Taken, and of the Field Work Done, by the Class in Geography in the Academy of Science and Art at Ringos, N. J., during the Year 1882. By C. W. Larison, M.D. Ringos, N. J.: C. W. Larison. 1883. 12mo, pages viii+292. $1.25.

A Sketch of the Geology of Cornwall, Including a Brief Description of the Mining Districts and the Ores Produced in them. By Brenton Symons, F.C.S., Assoc. Mem. Inst. C.E. With Geological Map of Cornwall, and Numerous Steel Plates, Illustrative of the Influence of Rock Formations or Scenery. London: Office of the Mining Journal. 1884. Cr. 8vo, pages vi+[2]+209 (including Index).

FURNACE MILL, AND FACTORY.

An important suit was instituted in the United States Circuit Court at Pittsburg, Pa., March 5th, involving the rights of the Westinghouse, otherwise known as the Philadelphia Company, to use the patents covering the safety-pipes for the supply of natural gas in Pittsburg and vicinity. The application was made for an injunction by William Kookogay, of New York, as counsel for Samuel R. Brick, who claims to be the inventor of all the safety-pipes, valves, and other appliances used by the company. The right to use them was given under certain restrictions, but they were, as alleged, violated. The application is for an injunction and for damages.

The Oliver Plow-Works, South Bend, Ind., which have been idle since the riot of Polish and Hungarian workmen on the 13th of January, started up March 5th, and it is announced will soon be running a full force.

It is reported that the Colebrookdale Steel and Iron Company, recently chartered, will erect a large steel-works this spring near Pottstown, which will be accessible to both lines of railroad.

The furnace and mines, coke-ovens, etc., of the Woodnam Iron Company at Wheeling, Ala., are all in successful operation. The furnace is averaging 103 tons daily.

The granite iron rolling-mill of the St. Louis Stamping Company has been working a full force since the first of the month.

B. M. Couch's machine-shops, at Florence, Mass., were damaged by fire March 8th. Casting patterns worth $6000 were destroyed, part of them being the property of the Northampton Emery Wheel Company, the Hampden Emery Wheel Company and others.

The Wampum Wire Mill Company has been organized at Wampum, Pennsylvania, with the following officers: Directors, Charles Rohrkart, Beaver Falls; Jacob H. Snedden, Johnstown, Pa; W. W. Kelvey, Newark, N. J., and Dr. M. H. Dean, of New Castle. Jacob Snedden was chosen General Manager, W. W. Kelvey Secretary, M. H. Dean Treasurer. Preparations were made for the starting of the mill at an early date.

At a recent meeting of barbed wire manufacturers held in Chicago, Ill., it was decided to advance the price of barbed wire one eighth of a cent a pound for March, and a further advance is threatened for April delivery.

The Juniata, Keystone, and Shoenberger's mills at Pittsburg, Pa., resumed operations March 9th, after having been closed down several months. The Ella Iron and Bolt-Works will soon start up.

The Consolidated Gas Company, of Baltimore, Md., will receive proposals until March 20th, for the building of two telescope gas-holders, 87 feet diameter and 45 feet lift, at the Spring Gardens Station. Bids will be considered from manufacturers only who have previously executed such work.

C. F. Wells & Co.'s white lead works, in Alleghany City, Pa., were partly burned March 9th.

The Fire Department of this city will receive proposals until March 16th for furnishing one steam fire-engine and 10,000, 6000, and 4000 feet of hose.

The explosion of three different powder-mills owned by Laflin & Rand, about four miles from Newburg, New York, occurred March 9th. Many buildings were jarred and windows shattered. The mills and sheds adjoining were totally wrecked, two men were blown to atoms, and one man was seriously injured. About two years ago, an explosion occurred at these works, destroying one mill and killing one man.

Messrs. James Cartwright, George Peake, Charles Cartwright, Frank B. Davis, and A. W. Jones, of Youngstown, Ohio, have purchased the Alikanna Iron Works, near Steubenville, and will operate them under the name of the Cartwright Iron Company. The capital stock of the company is $50,000. The mill will be put in operation as soon as the necessary repairs can be made. All kinds of small iron, such as cotton ties, hoops, rounds, and squares, will be manufactured. In connection with the mill, the company bought 120 acres of coal in fee simple. The vein is between four and five feet in thickness, and is said to be of excellent quality, especially adapted to the manufacture of iron.

The newly improved labor-saving machinery at the Edgar Thomson steel mill, Pittsburg, Pa., is operating satisfactorily. The daily run of steel rails on one train of rolls is over 400 tons.

The Lookout Rolling-Mill, Chattanooga, Tenn., was sold March 5th under court decree to A. M. Johnson and Nesbit Hazelhurst for $30,000. The mill will be put in operation at once. It has been closed down for a year.

The contract for the iron work for the ore dock at Ashland, Wis., has been let to the Ajax Iron Company, of Chicago. It embraces all the iron plating and steel spouts, and will aggregate 250 tons.

The Western Nail Association, at Pittsburg, March 11th, reaffirmed the old card rate of $2.25 for nails. Trade is reported a little brighter.

The recent sale of the Robesonia Furnace property at Lebanon, Pa., has been completed by the transfer of Mr. Ferguson's title to Mrs. Borie and Mr. White, of Philadelphia. They have decided to put it in the form of a limited company, to be called the Robesonia Iron Company (Limited), and have contracted to sell a half-interest to Mrs. Margaret C. Freeman and Miss Sarah H. Coleman, of Cornwall. William C. Freeman, of Cornwall, will be president of the company, and have the practical management of its affairs.

A New England firm has introduced a new process for galvanizing wire. It is claimed that by this new method a thorough union of the coating with the body of the wire is secured, and that in every case a smooth, firm surface results. Great softness, tensile strength, and uniformity of temper are also said to be obtained in the wire, while the coating itself remains intact after the wire has been tested by severe twisting.

It is stated that the extension of two years asked by the firm of Graff, Bennett & Co., at Pittsburg, Pa., on a portion of their indebtedness, is likely to be arranged without a general meeting of the creditors. A representative of the firm is visiting the larger creditors and securing their assent to the new arrangement, proposing as an inducement that Graff, Bennett & Co. shall sell certain properties not included in the mortgage for $650,000, and apply the proceeds to liquidating $150,000 of bonds now outstanding, thus reducing that form of indebtedness to $500,000. The proposition has thus far been favorably received by all to whom it has been submitted.

It is rumored that the Standard rolling-mill, Norristown, Pa., has been sold to parties who propose starting steel-works.

The newly incorporated Cartwright Iron Company, of Youngstown, Ohio, has purchased the Alikanna iron-works, near Steubenville, and will fire about April 1st.

Mr. Edward Williams, of Middlesborough, England, has been elected president of the Cleveland Iron-Masters' Association, and Mr. John Gjers has become vice-president.

An order for about 10,000 tons of steel sleepers for Indian railroad account has been placed with a firm in the Northwestern iron-making district of England.

All of the stove foundries in Troy, N. Y., are preparing to resume work, full-handed. The manufacturers say that they expect to do an average business. The Clinton foundry has 250 molders at work, and 200 more will soon be given employment. The other foundries are also almost full.

It is reported that the American Dairy Salt Company is trying to lease all the fine salt factories of the Onondaga Reservation for ten years. The lease is designed to take the place of the old Mutual Benefit Association, and contemplates securing uniformity of price and unity of interest. There are 325 water-rights on the reservation, but business has, of late, been depressed.

LABOR AND WAGES.

The Wabash Railroad has acceded to the demands of the striking machinists in the shops at Moberly, Mo.

The strike at the Calumet Iron and Steel Company's mills, at Chicago, Ill., has been amicably arranged, and as soon as necessary details about the mill can be arranged, work will be resumed. The discharged employé, on account of whom the strike originated, will not be reinstated.

The coal miners of Staunton, near Hillsboro', Ill., are all on a strike, caused by a reduction in wages. The mines are idle, work on the various mines having entirely ceased, the local authorities being compelled to ship in coal from a distance to supply the home demand.

The strike of the coal miners in the Pittsburg District, Pa., has assumed immense proportions, and it is conceded to be one of the most formidable ever inaugurated in the district. A general meeting of mine-owners was held March 11th, at which a resolution was unanimously adopted refusing to accede the advance. The indications are, that the struggle will be protracted.

RAILROAD NEWS.

The rumor of the purchase of the Marquette & Western Railroad by the Marquette, Houghton & Ontonagon Railroad Company, which has been current for some time, has been confirmed, and the latter road once more has a monopoly of the ore-carrying of the Marquette iron range.

The Massachusetts legislative party March 6th inspected the site for the proposed bridge across the Hudson River from Storm King to Breakneck Mountain. The projectors ask Massachusetts to guarantee the interest on bonds for construction not exceeding $5,000,000. It is not known what action the Railroad Committee will take. The bridge is said to be needed to shorten railroad communication between New England and the coal-fields.

The Cleveland Southern Railroad Company has just been granted a charter. The road will extend from Cleveland through the coal-fields near New Lexington, Perry County, Ohio, to the Ohio River, at Serdo, about 210 miles. It will be an air-line from the coal-fields to Lake Erie. At Parma, it will run through the quarry region. This proposed road, with the Baltimore & Ohio connection, will make a competing line with the Lake Shore to Chicago. It will be standard gauge.

The Lehigh Coal and Navigation Company has completed a branch of the Nesquehoning Valley Railroad from near Tamanend, Pa., to a junction with the East Mahanoy road, three and a half miles.

Leland Stanford, President of the Central Pacific Railroad, has officially announced the consummation of a long-contemplated consolidation of transcontinental interests. Hereafter, the Southern Pacific railroads of California, Arizona, and New Mexico, the Galveston, Harrisburg & San Antonio, the Louisville, Western Texas & New Orleans, and Morgan's Louisiana Railroad and steamship lines will be operated under one general organization. The Texas & Pacific and Missouri, Kansas & Texas systems of railroads will form a northern outlet, although not included in the combination.

William M. Clements has tendered his resignation of the position of Master of Transportation of the Baltimore & Ohio Railroad, which he has held for a number of years.

At a meeting of the Board of Directors of the Pennsylvania Railroad Company, March 11th, Walter Freeman, division freight agent of the united railroads of the New Jersey division, tendered his resignation to become commissioner to represent the joint coal interests of the Pennsylvania and Baltimore & Ohio Railroad companies. E. G. Dixon, at present freight agent of the Pennsylvania Railroad in New York City, and formerly connected with the Empire Line, has been appointed as his successor.

The sale of the Union Canal, recommended by the Master in Equity, for insolvency, will wipe out of existence a corporation more than ninety years old. The enterprise began as the Delaware & Schuylkill Canal, and had Robert Morris for its president. The canal ran through Philadelphia, and was not completed until 1828. Railroad competition long ago ruined its business.

The Chicago & Northwestern Railroad Company, it is reported, has reduced ore freights between Ishpeming and Escanaba, Mich., to 70 cents a ton, a reduction of 10 cents a ton, compared with last year's rate. With lake freight at 90 cents from Escanaba to Cleveland, the cost would be $1.60 cents a ton outside of dockage, insurance, and commission.

COAL TRADE NOTES.

ALABAMA.

The Woodward Iron Company during the past year built 63 improved bee-hive coke-ovens, in addition to those already on the ground. At the company's coal mine, part of the machinery is erected for operating a crusher and washer.

CANADA.

PROVINCE OF NOVA SCOTIA.

The annual meeting of the shareholders of the Intercolonial Coal Mining Company (Limited) took place at the company's office, 199 Commissioners street, Montreal, March 4th. The statements of account for the

year ended December 31st, 1884, were submitted to the meeting, and considered as very satisfactory. The quantity of coal marketed during that time was 114,882 tons. The following gentlemen were elected directors of the company for the ensuing year: Messrs. Gilbert Scott, H. A. Budden, Robert Anderson, D. L. Macdougall, James P. Cleghorn, Peter Redpath, Alexander Gunn, Henry J. Tiffin, and W. M. Ramsay. At a subsequent meeting of the board, Messrs. Gilbert Scott and Henry A. Budden were re-elected president and vice-president respectively, and Mr. W. J. Nelson reappointed secretary of the company.

DAKOTA.

Reports from Britton, Day County, state that in digging a well at that place a vein of coal eight feet thick was discovered at a depth of seventy-three feet.

ILLINOIS.

Judge Gresham, in the United States Circuit Court, at Chicago, Ill., March 9th, decided a motion for permanent injunction against certain residents of Illinois from perfecting an organization under the name of the Lehigh Valley Coal Company. The court remarked that the Lehigh Valley Coal Company was a Pennsylvania corporation doing business in Chicago, and that it was the owner of much property in the State. The defendants had obtained a license from the Secretary of State, to organize a company under this name. While their purpose did not appear to be honest, the State had a right to grant a license, and the Federal Court could not interfere.

INDIANA.

The new mine inspector has ordered the Town shaft, at Brazil, to shut down until the scales are fixed.

KENTUCKY.

The new coal company at Kensee has begun the shipment of coal from its mines.

MONTANA.

Recent tests have proved that the Sand Coulee coal makes good coke. Satisfactory experiments have also been made with coal from Arnold & Pott's mine, near Maiden.

NEW YORK.

NATURAL GAS.

A joint-stock company, with a capital of $15,000, has been organized for the purpose of putting down test wells in the towns of Aurora, Wales, and Elma. Ex-Supervisor Joseph D. Yeomans, Gen. Aaron Riley, ex-Supervisor Christopher Peck, R. G. Persons, Dr. Horace Hoyt, and Supervisor Henry H. Persons, all residents of East Aurora, are the incorporators. Operations are to begin as soon as the contracts can be let. The numerous natural gas springs in the vicinity of the village warrant the belief that gas may be found in paying quantities. The well now sinking on the Francis farm has reached a depth of 1200 feet. The company is confident, and will go to the depth of 2000 feet if necessary.

PENNSYLVANIA.

ANTHRACITE.

Proposals for 600 tons of anthracite coal, to be delivered at the United States Navy Yard, Pensacola, Fla., will be received by the United States Navy Pay Office, Philadelphia, until March 16th.

It is said that the Silver Brook mines, in the Beaver Meadow Mining District, which have not been in operation since 1872, owing to a series of litigation, will resume as soon as two breakers can be built.

In the United States Circuit Court, at Pittsburg, James M. Boyd, of New York City, has filed a bill in equity against the Pennsylvania Anthracite Coal Company and the New York, Susquehanna & Western Railroad Company, praying for the appointment of a receiver for the Anthracite Coal Company and asking that it be declared insolvent; that it be restrained from doing any further business until the further order of the court; to declare that the judgment under which the personal property of the company was sold was without consideration and fraudulent and void as against the Pennsylvania Coal Company and all other creditors and preferred stockholders of the coal company. The company was declared insolvent in 1879, and a receiver appointed, who remained in charge for three years; but under an agreement, the receiver was discharged and the corporation restored to the enjoyment of its franchises. The capital stock of the company was 20,000 shares at the value of $100 a share, of which 10,100 belong to the New York, Susquehanna & Western Railroad Company of New Jersey, and the remaining 9900 shares belong to Elisha A. Corey, William O. McDowell, J. S. Jenkins, and the Pennsylvania Coal Company and other individuals. At the time the coal company was restored to its rights, it was agreed by the railroad company and the other stockholders that the 9900 shares should become preferred stock, this being the consideration of the withdrawal of certain equity proceedings pending in the United States Circuit Court. Under that agreement, the mortgage indebtedness of $1,000,000 on coal lands of the coal company on the Lackawanna River were to be paid out of the moneys of the road, a certain amount was to go into the sinking fund for the general creditors, and provision was made for the securement of the preferred stockholders. It was also a part of the agreement that no additional mortgage indebtedness should be created. In violation of the agreement, it is asserted that other mortgage indebtedness was created by the railroad company owning the majority of the stock, and that a portion of it, amounting to about $200,000, personal property, and land belonging to the coal company, have been sold and bought in by the railroad company under the pretext that other creditors would have taken it. It is also asserted that the railroad company now has the affairs of the coal company and a great part of its property under its control; that the judgment stockholders have received no consideration in the matter; that their dividends remain unpaid; that the management of the business is causing great loss and sinking the coal company deeper into debt and into the power of the New York, Susquehanna & Western Railroad Company; and that the preferred stockholders will be at a great loss, and may lose all their interest unless the court interferes.

Mine Inspector Williams, of the Wilkes-Barre Coal District, has finished his official report showing the coal production in his district last year. The average number of days worked at all the collieries during 1884 was 20,357, against 22,369 in 1883; persons employed in 1884, 23,997, against 20,977 in 1883; number of tons of coal mined in 1884, 7,881,985, against 7,667,221 in 1883. In 1883, 89 persons were killed and 196 seriously injured, while in 1884 the number of persons killed was 97 and of those seriously injured 161.

Miesse, Diggles & Co. have almost completed their new colliery at Newtown. The breaker will have a capacity of sixty-five cars daily, which the workings will be able to supply almost from the start, the coal being taken from two drifts of ninety yards breast of Lewis vein, averaging about ten-foot thickness. A slope will shortly be sunk, and operations extended to much larger proportions. The machinery is erecting in the breaker, and coal will be shipped in the course of a month.

BITUMINOUS.

The Alleghany courts have again decided in favor of the defendant in a store order case. C. F. Todd sued the Hillsdale Coal Company for wages. He had bought on credit at a store in Hillsdale, and then assigned his wages in payment. The amount was deducted by the company. Todd claimed the latter had an interest in the store, and sued for his wages under the Schnatterly act. The court held his assignment was a bar to recovery.

COKE.

The Coke Producers' Association will give a banquet at Pittsburg, March 20th.

According to the Connellsville *Courier* of March 6th, of the 10,435 ovens in the region there were for that week but 2862 idle, as against 4258 two weeks ago.

SOUTH AMERICA.

ARGENTINE REPUBLIC.

It is announced officially that Colonel Olascoago, in charge of an exploring expedition in the Andern region, has discovered most extensive coal deposits that stretch for hundreds of leagues from the province of San Luis to the Andes and the Neuguen triangle. The samples of the coal exhibited are pronounced to be excellent. The government is so impressed with the information that it has appointed a commission of practical miners, headed by Señor Juan J. Elia, to determine all necessary data.

WEST VIRGINIA.

The following property of the West Virginia Oil and Oil Land Company will be sold at public auction at Parkersburg, March 17th. It embraces all that land in the county of Ritchie, situated on the waters of Laurel Fork of Goose Creek, Alum Cave Run, Short Run, and the waters of Oil Spring Run, and containing 1397 acres of land. Also another tract of land in the county of Ritchie, containing 124¼ acres. Also all the tubing lines belonging to the West Virginia Oil and Oil Land Company on the above premises, and all the improvements, machinery, and appliances and appurtenances owned by the company on the property above mentioned. A large proportion of said land is oil-bearing land, and is yielding large quantities of the best quality of natural lubricating oils and illuminating oils; and a portion thereof is underlain by a vein of good bituminous coal. The sale will be made for cash, and the purchaser will be required to deposit the full amount of his bid on the day of sale.

WYOMING.

In our issue of last week, we mentioned that the organization of a coal company at Laramie was in progress. The Laramie Land Coal and Mercantile Company has now been organized, with a capital of $20,000. The principal place of business will be at Laramie.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

GRAND CENTRAL.—As soon as the pumps start up and sinking in the shaft is again begun, says the Tombstone *Epitaph*, it is the intention of the management to resume sinking the winzes on the ledge from the 600 level; and then the great question of the character of the needed plant on the low water-level will be determined; not the necessity of a plant; for that is a problem upon which the hill properties are now preparing to lay out over a quarter of a million dollars.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—Official reports state that a parallel vein that may develop into a large additional mine is opening. This is the Woolford, about 600 feet east of the Empire, on the surface. The company is laying a track from the Woolford shaft to the mill, and will soon be able to test the milling value of the new ore. Meanwhile, it is sinking the shaft 100 feet, and the superintendent asserts that this new level (to be opened the coming summer) will surpass all its predecessors. This would not be surprising, as a gradual improvement as great depth has been attained has characterized the mine for ten years past.

EL DORADO COUNTY.

IDAHO.—This company has been formed at Georgetown, with a capital of $250,000, for the purpose of working, buying, and selling mines on the Georgetown divide.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The mill started up March 2d. Twenty miners are employed.

CONSOLIDATED PACIFIC.—During the week ended February 28th, the miners have cut into a formation entirely different from any heretofore encountered in the drift. It is identical with the rock cut in all approaches to the Fortuna vein, and is filled with seams and bunches of fine-looking ore, which become more numerous and better defined as they advance. In the cross-cut to cut Pacific ledge No. 2, they are also encouraged. They find the ground strongly mineralized. The presence of small stringers or feeders at short intervals is regarded as a favorable indication.

NEVADA COUNTY.

EAGLE.—This company has been formed, with a capital stock of $1,000,000, for the purpose of working the Eagle Bird quartz mine in Washington District. It is the intention to purchase, own, and control water rights, etc. The principal place of business is San Francisco.

EMPIRE.—Thirty stamps are to be added to the mill, making a capacity of fifty stamps.

GOVERNOR MORTON.—The capital stock of this gold mining company, which has just been organized, amounts to $1,000,000. Operations are to be carried on in Washington township. The principal place of business is San Francisco.

SAN BERNARDINO COUNTY.

BIG HORN ANDER.—It is reported that this mine, at West Calico, has been sold for $5000.

LONE STAR.—Work on this group has been progressing satisfactorily for several months. The shaft has attained a depth of 70 feet. It is said that there are in the group large bodies of low-grade ore that will pay well to mill, and enough high-grade can be taken out daily to operate the mine with a profit.

COLORADO.

ARAPAHOE COUNTY.

MCNAIR SMELTING COMPANY—The object of this company is to erect and operate smelting-works at or near Denver. The capital stock is $200,000. The incorporators are A. H. Clements, John O. Brockway, and Frank S. Rees. The principal business office will be in Denver.

RUDD DRY DIRT GOLD SEPARATING PROCESS.—Articles of incorporation have been filed by this company. The capital stock is $1,000,000. The principal office will be in Denver. The incorporators are Sidney R. Rudd, Robert T. Fair, and Michael R. Schultz. The objects of the company are to own, work, operate, buy, and sell dry placer mining claims, the manufacture in the State of Colorado of the Rudd dry dirt gold separation process machines, and the buying and selling of the same.

CHAFFEE COUNTY.

LONGFELLOW.—A rich strike has been made in this mine.

CLEAR CREEK COUNTY.

KOHINOOR & DONALDSON.—The mill has been started up. The tramway from the mill to the Champion mine is completed and has been put in motion.

CUSTER COUNTY.

BULL-DOMINGO.—The entire property of this company, at Silver Cliff, was sold under execution March 10th, and bought in by Mr. William M. Lent.

DOLORES COUNTY.

PASADENA.—All the interest of the Rico Smelting Company in its smelter building and grounds, coal-banks, coke-ovens, etc., has been conveyed to the Pasadena Reduction Company. The deed is signed by the Rico Smelting Company and J. R. Crooke, and the consideration named is $10,000.

GUNNISON COUNTY.

MOFFET SMELTER.—Mr. E. R. Moffet has sold his lead-works and real estate in Missouri to a Pennsylvania firm for cash, and has returned to Gunnison with an abundance of ready capital to carry out all his plans regarding his smelter. He will enlarge the capacity of the plant as rapidly as possible.

LAKE COUNTY.

CARBONATE.—The new shaft on this mine, after penetrating twenty-five feet of iron carrying large quantities of chlorides, has encountered porphyry. This ore discovery, being between the wash and porphyry, is a new feature on Carbonate Hill. Further development is watched with interest.

MAID OF ERIN.—The strike made in the Surprise shaft is improving with each foot of work. Drifting on the ore-body shows a face of mineral over five feet in thickness in one place, and in two other drifts good faces, all within a few feet of the shaft.

SILVER CORD.—The leases are producing some mineral. The company's workings are producing about fifty tons of ore daily, carrying a very large percentage of lead.

SUMMIT COUNTY.

WARRIOR'S MARK.—The alterations and improvements have been completed at the mill and operations begun.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—The report for the week ended March 1st shows ore extracted from first, second, and third levels, 2050 tons. Ore milled, 2100 tons.

IDAHO.

The miners' strike seems to be at an end in the Wood River Region. At the Queen of the Hills, Minnie Moore, and the Vienna mill, the men have gone to work at $3.50 a day.

BULLION.—The tunnel is driven on the Bullion-Ophir line at the rate of 240 feet a month. If no unforeseen delay occurs, the tunnel will strike the ledge the middle of May. Two weeks thereafter, stopes can be started, and men put to work extracting ore.

CAMAS NO. 2.—The owners of this mine, an extension of the Big Camas mine, have purchased a twenty-stamp mill in Colorado, and will place it in operation at the mine as soon as possible.

EUREKA.—From ten to twelve tons of ore are produced daily.

MINNIE MOORE.—Several attachments have been levied on this mine and works by former employés for wages due them. The total indebtedness of the company, for labor and supplies, does not exceed $7500. Arrangements are making to settle all claims.

MONARCH.—The new mill at Atlanta is working steadily, and producing one bar of fine bullion, worth about $1500, per day.

OPHIR.—The new hoisting-works are working splendidly. The exploring winze is down about 40 feet, all the way in rich ore.

MICHIGAN.

COPPER MINES.

The production for February of the mines mentioned is as follows:

	Tons.
Calumet & Hecla	1995
Atlantic	186
Franklin	183
Quincy	180
Allouez	130
Huron	112
Copper Falls	60
Hancock	35

COPPER FALLS.—The management contemplates enlarging the rock-dressing plant of the mine by the addition of two more Ball's heads.

IRON MINES.

CAMBRIA.—This company is sinking a shaft just north of the main workings of the mine, to strike the large ore-body found with the diamond drill. This promises to be one of the finest hematite properties in the section.

LAKE SUPERIOR.—The local management of the Lowthian mine has received orders to withdraw the pumps, permitting the shafts to fill with water. The mine is in good shape, has one of the best shafts in the mining region, and the water can do but little damage. There was no demand for the ore, which is a non-Bessemer. The company has sufficient ore at its old mine workings in Ishpeming to supply any demand that will be made upon it.

NORWAY.—Nothing has been done for a considerable length of time in the new shaft, owing to a lack of the necessary machinery for taking the water out. A temporary plant, however, of sufficient capacity, is getting into position, and the work of sinking will be resumed at an early day.

WINTHROP.—The Joliet Iron and Steel Company, it is said, is figuring to purchase this mine at Ishpeming. It is one of the best hematite mines in the district, and has a large showing of hematite.

MISSOURI.

JASPER COUNTY.

LONE ELM.—Arrangements have been perfected between E. R. Moffet, president of this company, and Joseph J. Solomon, representing George T. Lewis, of Philadelphia, by which Mr. Solomon is to have active control of the company's works in Joplin, and the works will be run to their fullest capacity, provided sufficient mineral can be procured. The present capacity of the Lone Elm works is 50,000 pounds of raw material a day.

MONTANA.

SILVER BOW COUNTY.

ANACONDA.—The company runs to its full capacity; of 26 furnaces, 22 are in constant operation. The 400-ton concentrator yields 160 tons of dressed ore, averaging 30 per cent in copper. Work in the mine goes on as usual.

BELL.—The mine and smelter continue to run satisfactorily.

LEXINGTON.—Shipments of bullion have fallen off considerably since last November; in fact, from an average of $100,000 monthly to about $60,000. At the same time, expenses go on as before. Under these circumstances, it is questionable whether dividends will not be passed entirely for the present. No fault can be found with the management of Mr. Wartenweiler, who did all he could in developing the mine; but thus far, the developments have not proved successful and no considerable amount of paying ore has been found. The monthly shipments of bullion are based on $1.29 an ounce; actual value only $1.06, which reduces receipts 20 per cent.

LIQUIDATOR.—Mr. S. Raunheim, of this city, has attached the property of this company.

MONTANA.—Operations have been with three furnaces. All the furnaces will start next week. At the East Colusa, the 500 and 600-foot level show magnificent ores, both east and west of the main shaft. Some high-grade shipping ore (copper glance) occurs in pockets, and a good deal of smelting ore is in sight. Development continues. No stoping has yet been done except upward of the 400-foot level. At the West Colusa, development to a depth of 160 feet and levels east and west of shaft show the continuance of the vein. The ore-body is remarkably large, from 17 to 20 feet wide and widening with depth. The ores are similar to those of the Anaconda in quality and quantity. The company intends to sink to a depth of 400 feet and run levels following the vein. At the Original Parrot, the shaft is down 300 feet and levels just started. The 130-foot level is all in ore, averaging about 12 per cent copper, and stoping will be continued.

PARROT SMELTING-WORKS.—The works run only two matting-furnaces at present. Very little ore is shipped from the mine to the works. It is proposed to resume work on all furnaces soon. The Manhès process seems not to be an economical success so far, the price of coke being as yet too high.

NEVADA.

James Crawford, Superintendent of the Carson City Mint, died at Oakland, Cal., March 9th.

CHURCHILL COUNTY.

The latest news in regard to the niter deposits of this county, reference to which has been made at various times in these columns, shows that B. F. Dahl *et al.* have relocated these claims, and caution all parties against intruding.

EUREKA COUNTY.

RICHMOND CONSOLIDATED.—With the exception of the refinery, all work at the furnaces was temporarily suspended February 28th. Work at the refinery will continue until the crude bullion on hand is worked up, which will be in the course of ten days, when work there will also cease for an indefinite period. The cause of the suspension of operations is assigned to the bad condition of the roads.

STOREY COUNTY—COMSTOCK LODE.

BULLION.—The croppings have been leased by six miners, who are cleaning out the old Crœsus shaft west of the old works, through which they will prospect the croppings or upper levels, which are believed to contain a large quantity of ore that will pay for working. This ore was passed by in early days, when the cost of milling was much higher.

CHOLLAR.—The south lateral drift from the west drift on the 3000 level is out over 100 feet in a formation of quartz and porphyry supposed to be the outer edge of a vein. Cross-drifts will soon be run to explore the ground to the west. Should the west drift on the Chollar 3000 level prove the existence of a body of ore, the Julia and Bullion combination pumps will be set to work and operations resumed in the lower levels of those mines.

CONSOLIDATED CALIFORNIA & VIRGINIA.—The mine is still yielding a small quantity of ore from the stopes in the northwest drift on the 1750 level. The ore taken from the 1200 level during the week ended February 21st under the Jones contract was of a much higher grade than that heretofore obtained from that level. The superintendent in his weekly statement placed the average assay value at $54.74 a ton, as per samples taken from 256 mine-cars.

GOULD & CURRY.—Measurements taken at the C. & C. shaft February 28th showed that the water had attained a hight of 50 feet above the floor of the station on the 2200 level. The north lateral drift from the station on the 1000 level of the Bonner shaft is passing through Best & Belcher ground, and will be extended to the south line of the Consolidated California & Virginia. A south drift has also been started from the same level in the Bonner shaft, and will be driven through Gould & Curry ground to the north line of the Savage.

HALE & NORCROSS.—The cross-cuts on the 2900 level strongly indicate a body of high-grade ore on that level. Its extent will take some time to determine. Cross-cut No. 1, south of the winze station, shows good ore in the face, but the body appears to be stronger to the north. West cross-cut No. 2, north of the winze station, is out eight feet in solid ore. The assays from about 50 samples show an average value of nearly $40 a ton, some of the assays running as high as $700 and $800. A lateral drift has been started north from the winze station on the 3000 level, from which a cross-drift to intersect the vein will be started.

KENTUCK.—It is reported that a large deposit of gold-bearing ore of a high grade has recently been found on the 1300 level, and is hoisting to the surface through the Crown Point shaft. This ore is shipped to the Rock Point mill for crushing. The Belcher Company uncovered this deposit several years ago in a

drift run into the Kentuck ground, but was prevented from taking out the ore.

KEYES.—This gold and silver mining company has been incorporated, with George T. Marye, Jr., Frederick Getchell, Alfred Wheeler, Matthew I. Sullivan, and P. J. Keyes as directors. Capital stock, $10,000,000. Rich ore was found on this property some two months ago. Work will begin at once, the indebtedness having been adjusted.

NEW HAMPSHIRE.

COOS COUNTY.

MILAN.—Successful operations are in progress at the mine.

UTAH.

BEAVER COUNTY.

CAMPBELL.—These concentrating and leaching-works at Milford are nearly completed.

HORN-SILVER.—According to reports dated March 1st, three stacks are still run at the smelter.

SUMMIT COUNTY.

BON HOMME.—This company, which owns a claim in Park City on which some $8000 or $10,000 have been expended, has been sued by J. H. Rogers, a Park City merchant. The amount is $422.45, due Mr. Rogers for materials purchased and for a number of miners' time-checks that he bought up from the holders.

ONTARIO.—In shaft No 3, the sixth level and drain tunnel are in over 2200 feet west, and work is pushed by three eight-hour shifts.

SAMPSON.—It is expected that the tunnel, work on which has been kept up so long and at such great expense, will tap the lower workings some time in April. Fifteen men are employed, and about $1500 in ore is taken out each month. There has been a large amount of money sunk in this property, but the showing in the bottom of the mine is said to be such as to warrant the owners in persevering.

WASHINGTON COUNTY—SILVER REEF.

CHRISTY.—The company is working five different claims, which are producing sufficient ore to keep a five-stamp mill in active operation night and day, crushing on an average 45 tons every twenty-four hours. The properties are opening by winzes, drifts, etc. There is considerable ore in sight in the stopes. The company is working sixty-five men underground and sixteen men in the mill. The mill is turning out on an average $25,000 worth of bullion a month. About half of the miners are prospecting and opening up the ground. When the proper connections are made so as to obtain sufficient air and proper drainage, the output can be doubled.

WISCONSIN.

BAYFIELD GOLD AND SILVER MINING COMPANY.—Work has been temporarily suspended. It will be resumed as soon as certain negotiations near Pratt now pending are settled.

ASHLAND.—It is stated that a block of stock was sold at $2.50 a share.

WYOMING.

WYOMING EXPLORING COMPANY.—In order to systematically prospect the different mining districts surrounding Laramie, ten of the wealthiest citizens are organizing a prospecting company to be known as the Wyoming Exploring Company. As soon as the snows permit, this company will begin prospecting and active operations.

ORE MARKETS.

DENVER.

For the silver and gold in ores, from 90 to 95 per cent of the New York quotation (gold being counted at $20 an ounce).

For the lead in ores, 15 to 30 cents per unit.

For the copper in ores, from $1 to $1.30 per unit.

Smelting charges from $8 to $20.

CLEVELAND.

No. 1 specular and magnetic Bessemer ores, per ton, $5.50@$5.75.

No. 1 specular (non-Bessemer) ores, per ton, $4.75@$5.

Bessemer hematites, $4.25@$5.

Non-Bessemer hematites, $3.75@$4.

MICHIGAN.

Offers are made for No. 1 hard ore of Lake Superior mines, for $3.20 a ton at the mine, and $2.85 for No. 1 hematites. No sales at these figures are reported.

The Lake Vermilion iron ore, now lying on dock in Cleveland, is offered at $4.50 a ton. It is an ore high in metallic iron, averaging 65 per cent.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 13.

The consolidation of the New York Petroleum Exchange and the Mining and National Exchange has been a topic of great interest to all connected with these institutions. It is expected that a large business will be done, and that the seats will, in a short time, reach a high figure. A joint committee is looking for a suitable building. The old Produce Exchange and the offices soon to be vacated by the Standard Oil Company are suggested as suitable, for the present at least. An election of officers of the Consolidated Exchange will be held next Monday.

The improvement in the market last week had but a short life, and dullness has again prevailed. The prices have remained the same, and only showed fluctuations in a few instances.

The financial statement of the Bodie Consolidated Mining Company for February shows cash on hand $88,183.56. No bullion was produced during the month. The mill, however, started up again on the 2d inst. The dealings in the stock have been small, amounting only to 850 shares, ranging from $2.35 @$2.40. Standard Consolidated has been more active, 5100 shares changing hands at from $1.10@$1.25, closing at $1.20. Bulwer shows but a small business at from 34@35c. Consolidated Pacific has ranged from 95@99c., the sales amounting to 3700 shares. One hundred shares of Mono were sold at $1.60. Five shares of Noonday at 50c. Twenty-six hundred shares of Gold Stripe at 2c. and 3c. Plymouth Consolidated continues a favorite stock, and it would not be surprising, if the good reports from the mine continue, to see this stock sold at higher prices. The transactions the past week amounted to 1365 shares at from $15.75@$16.38.

The sales of Horn-Silver have been larger, and the prices higher than the past week; 4940 shares changed hands at from $2.10@$2.75, closing at $2.60. Some 85 shares of Ontario sold at from $17.50@$18. Of Stormont, 600 shares were sold at from 6@7c.

The transactions in Colorado stocks present no interesting feature. Iron Silver sold at from $1@$1.15, sales amounting to 550 shares. New Pittsburg, a stock that has not been listed long, shows sales of 450 shares at from 49@50c. A lot of 100 shares of Leadville were sold at 35c. A large business is recorded in Little Chief, 2400 shares changing hands at from 23@25c. Climax, Amie, Lacrosse, and others show the usual transactions and prices.

As for a long time past, Sutro Tunnel and Consolidated California & Virginia show large sales. The former has remained unchanged at from 13@15c. The price of the latter, however, shows a downward tendency. It opened at 50c. and closed at 40c. Sierra Nevada went as high as 70c. during the week. The closing quotations, however, show but 55c. Hale & Norcross sold at from $5.50@$5.75. Considerable interest has been shown in the transactions of Eureka Consolidated, and during the week the price went from $2.95 to $3.90, closing at $3.75.

Moulton appears again on the list, with a sale of 100 shares at $1.30. Alice shows transactions amounting to 1500 shares, at from $1.85@$1.95.

Silver King holds its own at from $4.25@$4.50. Occasional transactions in Central Arizona are made at from 18@21c.

Homestake and Father de Smet are sold at the usual high figures.

The dealings during the week amounted to 69,142 shares, as against 101,723 shares for the preceding week, showing a decrease of 32,581 shares. A complete summary of the market will be found elsewhere.

MEETINGS.

Standard Steel-Works, No. 220 South Fourth street, Philadelphia, Pa., annual meeting March 16th, at ten o'clock A.M.

DIVIDENDS.

Adams Mining Company, of Colorado, has declared a dividend (No. 9) of 12½ cents a share, or $18,750, payable March 20th.

Barclay Coal Company, of Pennsylvania, has declared a semi-annual dividend of 3 per cent on the capital stock, payable on and after March 23d.

Phœnix Iron Company gives notice that $50,000 of the company's 7 per cent bonds have been drawn for the sinking fund, and will be paid off at par, on April 1st, at the treasurer's office.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, No. 49 Broadway, report as follows for the week:

The market opened Monday at 77⅛c., and sold up to 81⅝c. on Tuesday, and sold down yesterday to 77c. This covers the range of fluctuations this week. The cause of the weakness is due to several wells coming in in Thorn Creek district, which have increased production from about 7500 to 10,000 barrels, and to the additional fact that the Markham, a well on the Thorn Creek frontier, is reported to be promising a large development. The heavy selling by oil men, in apprehension of an extension of the district, has caused a steady decline in prices for several days. Exports of refined are lighter. The stocks of oil last month were reduced over 300,000 barrels, and they have been diminished over three million barrels within the past six months.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
March 7....	$0.78	$0.78⅜	$0.78⅛	$0.77⅝	5,263,000
9	.77⅛	.78⅜	.77⅜	.77⅜	3,562,000
10....	.78¼	.78⅜	.78	.80⅛	5,988,000
11....	.81	.81	.79⅛	.79⅛	6,251,000
12 ...	.79½	.80	.78⅝	.78¾	3,541,000
13....	.77⅞	.78⅝	.77	.77¼	3,508,000
Total sales.....					28,113,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. March 6.	March 7.	March 9.	March 10.	March 11.	March 12.
Albion						
Alpha						
Alta					.30	.25
Argenta						
Bechtel						
Belcher		.70	.70		.70	
Belle Isle						
Best & Belcher	1.12½	1.12½	1.12½	1.12½	1.12½	1.12½
Bodie	2.37½	2.25	2.25	2.25	2.37½	2 25
Bullion						
Bulwer						
Challar	2.25	2.25	2.00	2.00	1.87½	1.87½
Con. Pacific	1.00	1.00	1.00	1.00		1.00
Con. Cal & Va.	.45	.45	.40	.45	.40	.40
Crown Point				.70	.80	.75
Day						
Elko Cons						
Eureka Cons	2.75	2.75		3.00	3.00	3.25
Exchequer						
Gould & Curry	.90	.95	.80	.80	.80	.80
Grand Prize						
Hale & Norcross	5.37½	5.87½	5.12½	5.50	5.37½	5.62½
Independence						
Martin White					.50	
Mexican	.40	.40	.40	.35	.35	.35
Mono						
Mount Diablo	3.75				3.75	
Navajo	1.00	1.00	1.00	1.12½		1.00
Northern Belle						
North Belle Isle						
Ophir	.25	.25	.25	.25	.15	.20
Overman						
Potosi	1.00	1.00	.90	.90	.85	.90
Savage	1.87½	2.00	1.75	1.87½	1.75	1.87½
Scorpion						
Sierra Nevada	.40	.40	.35	.35	.35	.30
Silver King						
Tip-Top						
Union Cons		.30	.30	.30	.30	.30
Utah					.55	
Wales Cons						
Yellow Jacket	1.25	1.25			1.25	

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, March 12.

There is absolutely nothing doing in copper stocks, the market the past week being the dullest experienced in the memory of the oldest broker on the street. Calumet & Hecla has ruled strong, and sold up to $158, being a gain of $5 a share over the closing of last week; but orders to buy are in excess of the offerings, and the total sales are less than twenty shares. The stock is wanted at $158, but holders do not seem to be disposed to part with it at less than $160, and at that figure it is not wanted. Quincy declined to $29 on very small sales, but $29 is bid freely for it, without bringing out much stock. Franklin declined to $6.37½ on a single sale of 50 shares, and closes at $6.25 bid. The annual report published this week is considered quite satisfactory, in view of the low price for ingot copper, and it is confidently expected that a dividend will be paid some time during the present year. Allouez declined from 50c. to 37½c. The above comprise all the copper stocks dealt in by the regular Stock Exchange, and serve to show the extreme dullness in this class of securities.

In silver stocks, we note sales of Dunkin at 22½@20c.; Crescent, at 10c.; and Catalpa, at 20c. At the Boston Mining and Stock Exchange, there is but little doing, and prices are without material

change. Bowman Silver is the weakest stock on the list, and shows a decline of 3@5c., with sales at 15@16c. Dunkin, 19c. bid, 20c. asked. Consolidated Pacific, 93c. bid, $1 asked; small sales at 95c. "Cusi," $1⅛ bid, $1¼ asked.

In miscellaneous stocks, American Electric and Illuminating Company is dull at $1. Brunswick Berth, at 14c. Water meters, heavy at 20c. bid for New England, and 20@25c. for Standard.

3 P.M.—At the Board this afternoon, Calumet & Hecla sold at $158, and was offered at the same price, no bid. Quincy, $29 bid, $29⅓ asked. Osceola, offered at $9. Atlantic, $6 bid, $8 asked.

BULLION MARKET.

NEW YORK, Friday Evening, March 13.

DATE.	London. Pence.	N. Y. Cents	DATE.	London. Pence.	N. Y. Cents.
March 7	49	106¾	March11	49	106¾
9	49	106¾	12	49	106¾
10	49	106¾	13	49	106¾

BULLION PRODUCTION FOR 1885.

MINES.	States.	Month of February.	Year from Jan. 1st, 1885.
		$	$
*Adams, S. L.	Colo...	31,000	70,600
*Alice, G. S.	Mont..	.....	94,020
*Belmont	Nev..	——	10,003
*Boston & Montana, G	Mont..	.....	31,278
*Chrysolite, S	Colo...	.....	4,771
*Colorado Central, S.	Colo...	19,141	36,300
*Consolidated Bobtail, G	Colo...	.....	6,501
*Derbec Blue Gravel, G. S.	Cal	....	15,226
*Eureka Consolidated, S L.	Nev....	.....	27,395
*Father de Smet, G.	Dak....	29,303	63,870
*Grand Prize, S.	Nev....	.....	25,150
*Granite Mountain, S.	Mont..	39,200	102,100
*Head Center & Tranquillity	Ariz...	24,625	43,448
*Hecla Consolidated, G. S. L. C	Mont...	.....	‡56,905
*Hope, S	Mont..	... .	5,900
*Iron Silver, S L.	Colo...	.....	62,045
*Kentuck, S	Nev....	357	357
*Lexington, G. S.	Mont..	....	61,183
*Navajo, S	Nev....	25,632	82,894
*New Pittsburg, S.	Colo...	1,829	9,594
*North Belle Isle, S.	Nev....	2,118	2,118
*Oxford, G	N. S....	——	987
*Plymouth Consolidated, G	Cal ...	80.975	166,697
*Rooks, G.	Vt.....	7,092	14,201
*South Yuba, G	Cal	——	400
*Standard Consolidated, G	Cal	——	†24,799
*Stormont, S.	Utah...	.....	12,550
*Tombstone, G. S. L.	Ariz ...	‡59,002	107,106
		.....	1,138,308

*Official. G., gold; S., silver; L., lead; C., copper. Silver valued by the different companies from $1@$1.29·29 per ounce; gold, $20.67. †Net. ‡Not including value of lead and copper. —— No shipments during month mentioned.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remained 4 per cent. During the week, the bank gained £579,743 bullion; and the proportion of its reserve to its liabilities was reduced from 46 1/16 to 47, against 43 7/16 per cent at this date last year. March 12th, the bank gained £65,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 175,000 francs gold and a gain of 2,461,000 francs silver.

METALS.

NEW YORK, Friday Evening, March 13.

The annual meeting of the members of the New York Metal Exchange will be held at the Exchange March 18th, at three o'clock P.M. The election of officers and managers will take place Monday, March 30th; polls open from eleven A.M. to two P.M.

Copper.—This metal continues to attract the liveliest interest. There is a strong market here for Lake, due to demand from consumers. Among other items in this direction are rumored large orders (150,000,000) of cartridges for two European governments.

The decline in Chili Bars in London continues, and they have to-day and yesterday been quoted there at £45 15s. per ton, far the lowest price ever recorded. Best Selected, £51. There is no apparent good ground for this decline in the statistical position of the metal. On the contrary, there are many encouraging features.

The New Quebrada Company, which produced last year 3673 tons of copper, is said to have made contracts for its product for five years, the price to be based on that of Chili Bars. This should relieve the market somewhat, but the closing of some of the Australian and some of our American mines will tend to reduce the production, while the consumption is certainly not decreasing, and will probably increase. At the present price of Chili Bars, the price of Lake copper to manufacturers will scarcely exceed 10 cents (it was at one time supposed that the pool had placed a figure, 10½ cents, as the minimum below which copper was not to go, whatever the price of Chili Bars, but this position was abandoned). We quote Lake, outside of the pool, here at 11⅛c., and Orford at 10¾@11c., according to quality. The sales of the Orford Company for the past year have averaged 10·78 cents a pound. The Atlantic Company's sales for the year, 2,247,340 pounds, averaged 12·28 cents, while the company estimates at 10·6 cents the copper on hand at the close of the year.

The announcement was made to-day that Messrs. Pope, Cole & Co., of Baltimore, had made an assignment; their liabilities are placed at $1,000,000. It is supposed that their embarrassment has come through their connection with the Old Dominion Copper Company, of Arizona. The suspension will probably prevent the forcing of the copper now held by the firm on the market. Much sympathy is felt for the firm in its trouble. Its members have always enjoyed a very high reputation, and it is universally hoped some way may be found for tiding over the present difficulties.

Lead.—The firmness in this market, announced in our last, has been maintained, but not increased. We quote sales of a few hundred tons of Desilverized lead at 3·70c., with the market firm. There is no change in foreign lead. Cables from London quote Soft Spanish £10 10s.

Messrs. Everett & Post, of Chicago, telegraph to us as follows to-day:

There has been considerable more inquiry for both hard and soft lead, in consequence of which sellers have been asking a little more, but only a moderate amount of business has been transacted. Sales for the past week will probably foot up to 300 tons to local trade at 3·50c. Most holders, anticipating better prices, have withdrawn from the market, and refuse to sell for future delivery at present prices. There is a general disposition to buy futures.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day:

Market very firm. Sales during the early part of the week were 410 tons Refined lead at 3·50c., and later 250 tons Chemical lead at 3·50c., delivered at East St. Louis. Since yesterday, the principal holders of Desilverized lead are holding at 3·55c. Market closed strong and excited.

Tin.—There has been some business done here in tin: 20 tons on the 7th at 17·15 cents, April and May; 30 tons on the 9th at 17·05 cents, April, May, and June; 10 tons on the 13th at 17·10 cents on spot, are reported at the Metal Exchange. London cables to-day quote Spot Tin, £76 12s. 6d.; three months, £77 10s.

Spelter.—Spelter is quiet and unchanged at 4·25@4·50 cents for Domestic.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 13.

American Pig.—The market is without change, and only a moderate amount of business doing in the usual hand-to-mouth way. Prices remain unchanged at $18 for No. 1 X Foundry; $17 for No. 2; $16 for Gray Forge, good Lehigh brands. The feeling that business is in a better mood, if not actually much larger in quantity, has found a wide circle of believers, and the shortness of stocks in consumers' hands makes it certain that any increase in consumption will probably be followed promptly by such a general desire to lay in stocks that prices might take a jump. This, however, is not imminent, but simply a feeling that is becoming more and more general.

It is not worth while making a separate report of Scotch Pig, which comes in in small quantities, about 1050 tons during the past week. Prices remain unchanged, varying from $19 to $21.50, according to brand. In Glasgow to-day, the prices as cabled to the Metal Exchange remain at 54s. for Coltness to 42s. 6d. for Eglinton; Scotch Warrants, 41s. 3d., and Middlesboro' 34s. 1½d. (as a measure of the value of that important brand, and not that any of that iron comes in here). Spiegeleisen, 20 per cent, has been sold in some round lots during the week at $25.

Steel Rails.—We hear of sales made at or near $27 at the Eastern mills, and some chronic bulls report, without particulars, large sales. We find the market unchanged, with offers at $27 for heavy sections, at the mills, and $30@$33 for light sections, here. There are large quantities of rails needed by the roads, but the wherewithal to pay for them is lacking.

Philadelphia. March 13.

[From our Special Correspondent.]

There were rumors this week that an advance had been made on certain grades of iron. The fact is, that the makers of certain brands that are well sold up have been insisting upon higher prices for early deliveries. Some sales have been made at this advance. In a general way, there is no advance, and, according to good authority, there will be none. The ordinary and common brands of iron remain just where they have been all along. Quotations are $18, $17, and $16, but common Forge is selling at $14.50@$15. Every one is looking for a heavier pig-iron demand, and some are assured that they will get better prices. In fact, they predicted this a month ago, and for this reason refused to take certain low offers made then for late spring delivery. Three or four mills will run full time, begining next Monday. In a general way, the mill-owners are not stocking up.

Bessemer Iron.—There is very little selling, and quotations are nominally $19@$19.50.

Scotch Iron.—The brokers who sell Scotch iron are reporting a little more demand in a small way.

Merchant Iron.—Merchant iron is selling better because the cold weather is over, and the shops everywhere want material to work up for business lately secured. There is not a particle of change in the selling prices, and a good many mills are selling small lots at the same price they have been asking for large lots. There is nothing to induce the placing of heavy orders. One or two mills took orders for common iron as low as $1.50.

Nails.—Every thing is booming along in the nail trade, and the manufacturers for once in a long time are able to furnish good news as to orders and prospects of margins. There is a good deal of call for steel nails, but not enough to interfere with the iron nail output. Base prices are easily held.

Structural Iron.—The manufacturers of structural iron report the receipt of a good deal of business this week. Angles are two cents; beams and channels for large lots would be shaded a little.

Sheet-Iron.—There is a quiet, steady demand for sheet-iron that takes away the entire production. Prices for small lots are not shaded quite as much as last month. The opening up of railroad traffic has had a favorable effect upon sheet, heavy hardware, and merchant steel.

Plate Iron.—More business has been done, but prices are dull at $2 for Plate; $2.10 for Tank; $2.50 for Tees; and $3.50 for Shell iron. Some manufacturers think they will be able to start some of their idle capacity to work by the last of the month.

Steel Rails.—The Pennsylvania mills have been once more fortunate in gathering up considerable business for late spring delivery, but made up mostly of what are considered small lots, averaging from $27@$28 for standard sections. There is said to be a good deal of business in light sections.

Old Rails.—Old Iron rails are $17.50; old Steel rails, $15.50, according to buyers' views, but sellers entertain rather advanced opinions.

Scrap.—The yard-men are selling a good deal of scrap to the mills, and are holding prices up, although the fair weather of the past few days has allowed a good deal of stuff to get into market.

Louisville. March 10.

[Reported by GEORGE H. HULL & CO.]

The market for pig-iron shows no change during the last week. The demand is only moderate, but prices remain the same as last week, excepting Southern Coke No. 1 Foundry, which we quote at $16.50@$17.50, and No. 2 at $15.50@$16.50.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 13.

Anthracite.

The cooler weather and March winds keep up a liberal consumption of domestic sizes of coal, and furnish a sufficient demand to hold prices quite steady, despite the larger production of March, the quota for which is 1,800,000 tons. The prospect for the month's business

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 7.		March 9.		March 10.		March 11.		March 12.		March 13.		SALES.
	H.	L.	H.	L.	H.	L.	H	L.	H.	L.	H.	L.	
Alice, Mon.	1.95	.....	1.95	.....	.....	.....	1.90	.....	1.90	.....	1.85	.....	1,500
Amie Con., Co.	.05	.....	.05	.....	.....	.....	.....	.....	.....	.....	.03	.....	2,100
Argenta	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne.	.....	.....	.....	.....	.19	.....	.18	.....	.20	.....	.....	.....	1,000
Bodie Cons., Ca.	.....	.....	2.35	.....	2.40	2.35	2.35	.....	2 40	2.35	.....	.....	850
Breece, Co.	.....	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bulwer, Ca.	.....	.....	.35	.34	.35	.....	.35	.....	.....	.....	.....	.....	975
California, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Castle Creek	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Chollar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.00	.....	300
Chrysolite, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Cal. & Va., Ne.	.50	.49	.49	.....	.45	.....	.46	.43	.43	.4	.40	.....	12,517
Cons. Va., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka Cons., Ne.	3.05	2. 95	3.00	.....	.....	.....	3.00	.....	3.10	3 05	3.90	3.75	1,035
Father de Smet, Dk.	.....	.....	.....	.....	.....	.....	.....	.....	6.00	.....	.....	.....	200
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.03	.02	.....	.....	2,600
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.38	.....	.....	.....	.....	.....	100
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Ne.	.....	.....	.....	.....	5.50	.....	5.63	.....	.....	.....	5.75	.....	630
Hall-Anderson, N. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	.....	.....	10 75	.....	10.50	.....	.....	.....	10.50	.....	140
Horn-Silver, Ut.	2.10	.....	2.45	2.30	2.50	2.40	2.60	2 45	2.75	2 50	2.70	2.63	4,910
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	.....	.....	.....	.....	1.15	1.05	1.00	.....	1.00	.....	.....	.....	550
Leadville C., Co.	.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Little Chief, Co.	.25	.....	.26	.....	.25	.....	.24	.....	.....	.....	.23	.....	2,400
Little Pittsburg, Co.	.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moulton	.....	.....	.....	.....	.....	.....	.....	.....	1.30	.....	.....	.....	100
Navajo, Ne.	.....	.....	.....	.....	.....	.....	1.05	.....	1.05	1.00	.....	.....	1,100
Northern Belle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut.	.....	.....	.....	.....	18.0	.....	17.50	.....	.....	.....	17.75	.....	85
Ophir	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.75	.....	200
Plymouth	15.88	15.75	15.88	15 75	16.00	15.75	16.13	15.75	16.38	16 00	16.25	16.13	1,365
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	2 10	.....	.....	.....	1 95	.....	1.75	.....	.....	.....	800
Sierra Nevada, Ne.	.55	.50	.48	.45	.....	.....	.70	.....	.65	.45	.55	.....	2,150
Silver King, Ar.	.....	.....	.....	.....	4.50	.....	.....	.....	4 25	.....	.....	.....	250
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	1.20	1.10	1.20	1.15	1 20	1.15	1.20	.....	1.15	1.10	1.25	1 20	5,100
Stormont, Ut.	.....	.....	.....	.....	.06	.....	.07	.....	.....	.....	.....	.....	600
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	March 7.		March 9.		March 10.		March 11.		March 12.		March 13.		SALES
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
American Flag	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, G.	.....	.....	.....	.....	.....	.11	.....	.....	.....	.....	.....	.....	300
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'icher, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.18	.....	.20	.....	.20	.....	.22	.....	.21	.....	.....	.....	900
Climax, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	900
Colorado Central.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Pacific	.99	.97	.99	.96	.99	.97	.99	.98	.98	.95	.95	.....	3,700
Dahlonega	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hortense, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kossuth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.10	.....	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	3,500
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	.....	.....	.50	.....	.50	.....	.45	.....	.....	.....	500
Mono	.....	.....	.....	.....	.....	.....	.....	.....	1.60	.....	.....	.....	100
New Pittsburg	.....	.....	.....	.....	.....	.....	.50	.49	.50	.....	.50	.....	450
Noonday	.....	.....	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pri'nt'l & Miller, S	.....	.....	.12	.....	.....	.....	.12	.....	.12	.....	.....	.....	800
Rappahannock, G	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	.06	.....	600
Red Elephant, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.15	.13	.15	.14	.15	.14	.15	.14	.14	.....	.....	.....	12,100
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.55	.....	400
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 41,887. Non-dividend shares sold, 24,255.

continues good, and prices are practically unchanged and may be quoted as follows, f. o. b.:

Broken and Egg	$3.15@$3.20
Stove	3.90@4 00
Chestnut	3.50
Pea	2.50

Prices for free-burning or Wyoming Valley coals vary but little from the hard Lehigh, most consumers preferring them for domestic use, but some still having a prejudice in favor of the hard "Lehigh."

Pea coal appears to be growing in favor as a "domestic" size; in fact, in base-burning stoves it is quite as convenient and economical as chestnut size at equal prices, while it is quoted $1 per ton less. It will soon increase in price, and before many years will bring as much as chestnut or stove coal. This will leave only the large sizes and buckwheat coal as manufacturing sizes; but as bituminous coal undersells the broken and egg sizes, and is therefore destined to supplant them for manufacturing purposes, it seems inevitable that the future of the anthracite trade points either to its use almost exclusively for domestic purposes (which is a very uncertain outlook, in view of the probable use of gaseous fuel), or to such a reduction in its price as will equalize it with bituminous coal. We shall, in our next issue, discuss another and important view of the future of this trade. The Delaware & Hudson Canal Company has issued the following circular:

This company is now prepared to enter orders for coal of the present year's production, deliverable at Rondout or New York harbor, upon the following terms:

First. Orders will be received at this office for Lackawanna coal, to be delivered at Rondout or this harbor, during the season of canal navigation (April 10th to December 1st), or during any portion thereof, upon the usual conditions of sale and shipment hereunto annexed.

Second. Such orders will be registered upon the books of the company in regular turn as they are received, until Thursday, the 26th inst.; when the books will be closed, and as soon thereafter as practicable parties will be notified of the quantities for which their respective orders have been accepted.

Third. The coal will be delivered at Rondout or this harbor, during the time agreed upon, at prices to be fixed by the company and announced by circulars from time to time, as usual.

Fourth. Purchasers will be expected to notify the company on or before the first of the month of their intention to take or decline the coal allotted to them for that particular month. Failure on the part of the company to receive any such notice will be regarded as equivalent to an acceptance of the quota.

Fifth. Purchasers may decline taking their quota for any one month without prejudice to their rights respecting the proportions falling due in later months. The usual conditions for the sale and shipment of the coal obtain.

The contracts for gas coals for New York, covering about 200,000 tons, have been closed this week at $4 per ton delivered. The Eastern markets have not yet been fixed. The coals sold are the usual Pennsylvania and Westmoreland and Scott's Ocean Youghiogheny.

Bituminous.

There has been some business in this fuel during the week, at prices, as usual, below the pool rates, which nominally remain $2.70 Baltimore, $2.80@$2.95 Philadelphia, $3.25 New York, $3.50 Boston and Sound.

The Long Island Railroad, we learn, has made its contract for a considerable quantity (between 25,000 and 40,000 tons) of a Clearfield coal coming over the Beech Creek and Reading railroads. The price is said to be between $2.75 and $3, as against the pool rate, $3.25. The coal will probably be shipped in gondolas, which will be ferried across the harbor and delivered to the Long Island road without breaking bulk. This contract up to last year was filled by the leading Clearfield company, but this year it has been taken from them.

We hear many complaints from operators in the Clearfield region of discriminations made by the Pennsylvania Railroad in its freight contracts, and we shall have more to say on this subject next week.

The Connecticut River Railroad contract, about 12,000 tons per annum, has been taken by unexpected parties. From this and other offers of which we have heard, it appears that the pool prices and cast-iron agreement either have not been heard of, or are looked upon as mere empty figures of speech.

We have many times called attention to the advantage of adopting the English, and indeed the elsewhere universal, practice in the house delivery of coal, to put it in sacks holding two or three hundred pounds, instead of our custom of incumbering the sidewalks and dirtying the houses with it. Probably 25 cents a ton would be a moderate estimate of the cost of delivering coal from the sidewalk for domestic use in this city, and certainly one half this amount would pay for the delivery, use of sacks, etc., were sacks employed, while the comfort to householders and to pedestrians would be beyond calculation. Why does not some enterprising dealer adopt this improvement and advertise it?

Philadelphia. March 13.

[From our Special Correspondent.]

The anthracite coal trade is rather quiet and uninteresting. No large contracts were closed this week, and but few inquiries are coming to hand. It is a little too soon for the heavy season contracts. There is very little if any uncertainty as to prices, or what prices will be. Demand will be very heavy, to all appearances, and from all reports made from outside markets, from Boston to Chicago. The probabilities are, that this year's Western domestic demand will show quite an improvement over last year's. The local demand is less urgent, and for domestic sizes prices are firm. Some shading in manufacturing sizes is likely to take place before the larger season contracts are placed. There is a good deal of dissatisfaction among consumers, notwithstanding the drop in prices. They think it is not enough, and predict a further decline, at the same time predicting an expanded consumption. The reports to-day from New England distributing points show a need of replenishment. Vessels are nominally $1.50 to Boston, but nothing more than an occasional cargo has gone out since the first evidence of a breaking up. The vessels are all getting into shape for an active season.

Special interest centers in the soft coal trade. The bituminous operators are deeply in earnest. Great injustice and damage have for years been done to the mining and manufacturing interests of this State, and the industrial and commercial interests of this city, by the unjust discriminating policy of the Pennsylvania Railroad Company, which seems armed at all points and able to overpower all opposition. To-day, Senators Wallace and Lee submitted a report to the Senate Judiciary Committee, which was presented to the Senate, the design of which is to enforce a constitutional provision that will make it illegal to charge a higher rate for short hauls than for a longer distance, as is now sometimes done. It recites several constitutional provisions relating to railroads, requires publicity of rates, gives treble damages for injuries sus-

tained, and imposes criminal penalties for violation; and makes it illegal to charge more for a short haul than a long haul.

The business interests have been greatly crippled by this discrimination policy that the Pennsylvania Company clings to. Business men, coal miners, and shippers' agents growl and complain, and protest and appeal for a hearing in influential public prints without avail. One, two, or three favored producers take the cream of contracts under private rates, while the great body of the trade suffers. The railroad representatives have thus far not shown themselves, fearing the cross-examination to which they would be ruthlessly subjected. This Falstaffian policy with reference to the bituminous coal trade has aroused deep but perhaps ineffectual indignation. The operators hope, but fear that our law-makers are owned by their masters. This vast evil will be crushed out before the movement subsides.

Some bituminous operators, it is believed, have closed certain large New England contracts. At least, negotiations are pending. There are rumors that important sales of West Virginia coals would be effected shortly.

The coke trade is steadily improving. Some buyers are in the market this week, and by Saturday will have arrangements completed for the season—to June 30th. Coke will likely be firm.

Clearfield shipments for the week ended March 10th were 72,715 tons; for the same week last year, 54,069 tons; surplus, 18,646 tons. For the year, 536,611 tons; for the same time last year, 487,393 tons; difference, 49,223 tons. Cumberland & Pennsylvania road, 214,812 tons; for the same time last year, 202,751 tons. George's Creek and Cumberland, 25,604 tons, against 26,543 tons for the same time last year.

Buffalo. March 12.

[From our Special Correspondent.]

Local trade in anthracite and bituminous coal is active in consequence of the continued severe weather. There are no changes in prices made public. Our manufacturing establishments report improvement in demand, and as a consequence longer hours of work and more consumption of coal.

Dealers and the trade generally are awaiting the announcement of the coming season's programme of prices, etc.; but they do not hesitate to make contracts on private terms when occasion offers.

Our vessel-men say that they would not predict the opening of navigation before the end of April or the beginning of May; but you know almost as much about it as they do. The indications, however, are for a late opening.

But little stock of coal has accumulated here this winter; the mines having been run under restrictions made by the combination, which, taken in connection with the severe weather, causing an extraordinary demand, accounts for the short supply in a great measure. According to one statement, the stocks here do not aggregate 35,000 tons, against 120,000 tons a year since.

Although nothing has thus far been made public relative to Lake freights on coal from this port to Western points and Canada, a reliable forwarder gave me the following figures as those that he would be willing to contract at for carrying gas-coal per 2000 pounds, on the Erie Canal at the opening of navigation: To Buffalo, Albany, Troy, and Cohoes, $1; to Utica, 85c.; to Syracuse, 75c.; and to Rochester, 60c. These figures include loading and unloading. This statement will be a guide for nominal rates, and in some sense a feeler in freight charges.

It is worthy of record that all the railroad machine and car-works at this port are employing quite an army of men on full-time. The object seems to be to get all the crippled moving stock in good shape for the spring business. This work causes a very satisfactory state of activity to exist in the repairing and repainting departments of passengers cars, as well.

To-day, the bituminous coal men will start on their annual pilgrimage to the Dominion of Canada—Montreal the objective point—to see what can be done in the way of contracting for the supply of the Grand Trunk Railroad with coal. The details of the contract were forwarded you two weeks since. The pilgrimage generally lasts two weeks, so that you will have to hold a Lenten fast for results for that period of time at least. Not being in the "inner circle," your correspondent knows nothing of the "ways" and "means" of the pilgrims; but outsiders consider that the bituminous "boys" have a lively time with their Canadian cousins during their sojourn in Victoria's colony.

The meeting of the bituminous coal operators and dealers in this city on Tuesday last was well attended. Among those present were Col. Ensign Bennett, Bell, Lewis & Yates, H. C. Springer, Horace A. Noble, Powers, Brown & Co., Bright, Dowdell & Co., all of Buffalo; D. Udridge, of Erie; T. J. Skidmore, of Fredonia; D. S. Robinson, of Saltzburg; T. C. Pears, of Pittsburg; Robert P. Cairn, of Stoneburg; and P. Westerman, of Sharon, Pa. Mr. Noble was elected chairman, and Mr. A. Dowdell secretary. The proceedings were kept profoundly secret. The leakages and conclusions are thus reported by one of the brightest of the staff of the *Courier* newspaper, and I send his statement as being undoubtedly a fair exhibit: "On the best authority, it was ascertained that a majority of those present were satisfied with the agreement formulated and signed by the railroad men, and that the producers formulated a pooling agreement exactly similar to that adopted at the opening of the present year by the hard coal men, except that they do not undertake to make any allotment, simply making the supply at the mines equal to the demands, in a general way. It is thought that such a scheme will work well with all the railroads, and while the Rochester & Pittsburg will not do quite as much business as it did during the past eight months, yet it will make just as much money under the pooling arrangement. The producers claim that they are entitled to a fair price for coal, and that this is all they want. The preliminaries will be fixed at the meeting Wednesday morning, and the names of the parties will then be affixed. The price fixed upon could not be obtained, and in all probability no circular will be issued until after the Montreal conference, for there is music in the air on that score. Some of the Ohio soft coal men have been after the Grand Trunk's order for 600,000 tons, and have made it an argument that the Buffalo producers were going into a pool to put up prices. So the matter will have to be handled carefully, and may prove a damper upon the buoyant spirits of our Buffalo men while they are off on their holiday. There is not much doubt but that they will capture the order about as they did last year, and that the prices obtained will be made the basis of other important tenders from railroad managers, who usually look to the Grand Trunk to make a price."

The concluding session was held yesterday, and much surprise was expressed that the foregoing had got into print. The chairman stated "that they would be happy not to have many more guesses so near the truth." After the meeting was over, it was learned that the details as outlined yesterday were carried out, and that the agreement not to cut rates longer was signed, sealed, and delivered; also, that no specific rate had been made, it being thought advisable to wait for the outcome of the Grand Trunk meeting before doing any thing in that line. The producers propose to arbitrate their grievances in the future by the aid of a board of three commissioners. The outline of their authority and policy was not fully determined, but will be reported on at a future meeting, and in the mean time has been left in the hands of Mr. Noble. The commissioners are J. A. Hinds, representing the New York, Lake Erie & Western, Ensign Bennett for the Buffalo, New York & Philadelphia, and George H. Lewis, of the firm of Bell, Lewis & Yates, for the Rochester & Pittsburg.

There was a genuine sensation yesterday among the coal men of Buffalo upon the circulation of the report that Bell, Lewis & Yates had been made the managers of the Erie's coal business. The story was not given out generally, and was only known to a select few outside of the company's office. The report is, however, believed to be true. If so, it is one of the most important events that the trade has known for years, and will tend to revolutionize the soft coal business. This change virtually gives Bell, Lewis & Yates the monopoly of the trade. They are now working on a long-time contract with the Rochester & Pittsburg, which has thus far proved, and bids fair to continue to be, a very profitable one. The Rochester & Pittsburg owns in its own right in the neighborhood of 6000 acres of as valuable coal lands as are in the State of Pennsylvania, and has every facility for mining and shipping at a cost claimed to be ten cents lower than any of its competitors. To this, add the tremendous influence gained as the authorized and exclusive agents of the Erie, with all its machinery, its various routes, and the splendid trade that it has worked up in the years it has been before the people, and the result is a combination impossible to vanquish and very hard to equal. The negotiations, it is learned, have been in progress for a long time. Two years ago, while the three-handed fight was at its highest, Messrs. Lewis & Yates went to New York to have an understanding. Stepping over the irate Mr. Frisby, they had a conference with President Jewett, and explained the situation to him in such a lucid way that the old gentleman opened his eyes. He said he had never heard their side of the story in that way before, and was impressed with the practical ideas they presented. The negotiations were not cut off, it seems, with his retirement, and the outcome of the whole matter is, that Bell, Lewis & Yates are the lucky possessors of the Erie contract. From this, it will be seen that the people who to-day go to Montreal to bid for the Grand Trunk award will have a hard road to travel. Last year, Bell, Lewis & Yates had 170,000 tons of it, and the Erie had nearly as much more. Evidently there is not much left for the orphans.

Boston. March 12.

[From our Special Correspondent.]

The demand in the anthracite branch of the market has been wholly for coal for immediate shipment. While this inquiry tends to keep the market fairly active, there is, however, less activity on the whole, and the quick demand for spot coal should not have a misleading effect. There is very little business given for future delivery, and although the amount at tidewater is not large, yet there is considerable coal mined, so that the allotment for March should be enforced.

There is no especial change in f. o. b. prices. There is not that firmness noted in our last, as more arrivals came along with the few mild days, and afforded temporary relief. We quote f. o. b. prices as follows:

At New York, Stove, $4.10@$4.25; Egg, $3.50; Broken, $3.35@$3.50; Pea, $2.25@$2.50; Nut, $3.35@$3.50. At Philadelphia, $3.90@$4 for Stove; $3.25@$3.50 for Egg; $2 for Pea; $3@$3.15 for Broken. Special coals, $4.75@$5 for Broken, $5.35@$5.50 for stove.

There has been a change in pocket prices, which are now as follows; White Ash Broken, $4.85@$5; Egg, $5; Stove, $5.75; Nut, $4.75; Pea, $3.50; Lykens Valley Egg, $6.85; Stove, $7.

The bituminous market has been quiet this week. We do not look for any marked improvement for two weeks or more, or until the need of buying is more urgently felt by those who keep out of the market. A great many bids have been put in, from which no returns are yet received. March 1st having been passed, the pool has its binding force. According to its provisions of $2.25 at Baltimore, coal would cost $3.75 laid down at Boston to-day; and in taking season contracts at $3.50, there is a considerable risk. As for the Norfolk and Western people, there is no warrant for believing them to be bound by the pool, although they may choose to conform to it voluntarily. It is expected that they will act in harmony with it; and with pool coal selling at $3.50, there is very little margin for any one to take any other course. The Norfolk & Western will, however, undoubtedly do business independently of any pool. It denies the report that it has sold coal at $3.15 delivered.

It is reported that a contract for 15,000 tons of pea coal has been taken by the Philadelphia & Reading where it had exceptional facilities for delivering a portion of the contract. The Pacific Mills are reported to be in the market for George's Creek coal, and it is expected that their scalp will soon be taken.

Cargo lots are selling at $3.70@$3.75 delivered.

Freights are firm, as last noted. We quote:

New York, $1.25@$1.30; Philadelphia, $1.50; Baltimore, $1.50@$1.60; Newport News, $1.35; Richmond, $1.40@$1.45; Cape Breton, —@—; Bay of Fundy, —@—.

There is less retail trade than last noted, but there is a very fair trade. We quote:

White ash, furnace and egg	$5.25@$5.75
" " stove and nut	5 50@ 6.00
Shamokin, egg	6 00@ 6.25
" " stove	6.25@ 6.50
Lorberry, egg and stove	6.50@ 7.00
Franklin, egg and stove	7.50
Lehigh, furnace, egg, and stove	5.50@ 6.00
" nut	5.75@ 6.50

Wharf prices: Stove, $5; Broken and Egg, $4.75.

The receipts of domestic coal at Boston for February show a decrease of 21,149 tons. The receipts from January 1st to March 1st have been 124,200 tons, showing a decrease, as compared with the same period last year, of 41,219 tons.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended March 7th, and year from January 1st:

TONS OF 2240 LBS.	1885.		1884.	
	Week.	Year.	Week.	Year.
D. & H. Canal Co.	74,296	480,218	44.008	507,781
D., L. & W. RR. Co	82,715	620,212	79,751	750,309
Penna. Coal Co.	...	78,083	13,948	155,581
L. V. RR. Co.	30,383	186,883	18,733	213,510
P. & N. Y. RR. Co.	3,757	20,042	2,820	30,236
North & West Br. RR.	17,775	189,942	12,599	143,400
L. V. RR. Co.	106,030	572,373	71,453	687,936
S. H. & W. B. RR.	2,387	21,141	5,322	36,520
P. & R. RR. Co.	232,263	1,416,691	148,154	1,529,004
S. Line & Sul. RR. Co	1,230	15,334	1,280	13,907
P. & N. Y. RR.	3,301	23,594	2,786	29,871
Total	554,137	3,624,513	400,854	4,098,055
Increase				
Decrease		473,542		

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1880	3,617,342 tons.
" " " " 1881	4,687,291 "
" " " " 1882	4,111,780 "
" " " " 1883	4,452,936 "

The increase in shipments of Cumberland Coal over the Cumberland & Pennsylvania Railroad and branches amounts to 12,061 tons, as compared with the corresponding period of 1884.